

J. Gerton

ex domo S. Valentyni Crewe.

THE
Historie of Man, sucked
from the sappe of the most approued
Anathomistes, in this present age, compiled
in most compendious fourme, and now published in
English, for the vtilitie of all godly Chirurgians,
within this Realme, by *Iohn Banister*, Master
in Chirurgerie, and Practitioner
in Phisicke.



Ter. And.

*Si illum obiurges, vita qui auxilium tulit,
Quid facias illi, qui dederit damnum, aut malum?*

If that for him that aydes thy lyfe, thou chidynges vp doest lay?
What canst thou do to him that hurtes, or seeketh thy decay?



AT LONDON,
Printed by Iohn Daye, dwellyng
ouer Aldersgate.

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¶ *Cum gratia & Privilegio Regie Majestatis.*

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THE HISTORY OF MAN

Section from the type of the first edition
of the work published in the year 1800
and the second edition of the work
published in the year 1810
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published in the year 2020

Printed by John W. ...
and the ...

TO THE RIGHT WORSHIP

full, Syr Frauncis Willoughby, Knight, Iohn Banister, your most bounden, wisheth the dayly encrease of vertuous knowledge, and happy health, both here, and euerlastyngly.



Like as the earth was not made to lye waste, and voyde, as a rude congested heape, but to bring forth copious store, and that in sundry sortes, of creatures, corne, and frutes: neither those, as to glory in the riches of her owne proper nature, ordained, but for the speciall behoofe, vse, and utilitie of mankind: euen so (right worshipfull) is man for mā, and all things for the cause of others, engendred. Nothing hath a peculiar life. Nothing ioieth without societie of other.

Wherefore there ought to be one purpose, and inclination in all men, that a like utilitie, and of all things, may be to euery one. Which if any man do snatch vnto him selfe, all humane fellowship is dissolued. Cic. off. lib. 3.

And if nature do prescribe this, that one man should assist, and take care of another, if it be but onely for the cause that he is a man, it is necessarie, according to the same nature, that the utilitie of all things be common. For no man, of wit, or understanding (saith Demosthenes) will suppose himselfe to be borne onely to his father, and mother, but also to his countrey. Why, what is betwene? Euen this, that he, who supposeth himselfe onely to be borne to his parentes, expecteth a fatal and naturall death: but he, that acknowledgeth his birth to his countrey, rather, then he will see the same in seruitude, shall willingly put him selfe into the handes of death. Which caused that valiaunt young Romane Curtius to prostrate him selfe, headlong, into the insatiable gulphe of the earth, which sodainly had opened in the market place, that (I say) he might free, and (as it were) raunsome the whole Citie from the terror of that monster. With no lesse pietie haue some abandoned themselves, lest, by their own prosperitie, the state of the commons might be impaired. As Genutius Cipus, being Pretor, and walking forth of one of the gates of Rome, their sprang forth of his beady hornes, vpon a sodaine, and answer being giuen, that, if he would returne into the Citie, he should be king: he, that it might not come to passe, forthwith freely commaunded him selfe into perpetuall exile. If then it be so, that a solid common wealth is most prosperous, and that is a solid common wealth, whereof the faithfull inhabitantes beare themselves as the true members of it, their naturall body: of duetie ought we that are the partes, to vse, inuent, and communicate that (eche one according to the portion of his talent) amongst our selues, which may procrastinate the continuance of the healthfull state of our body, that is, the common wealth.

And he that endeouereth nothing to further it, is vnnaturall, like as he that hindreth the same, is, as a rotten member, worthy to be cut away. To this saith the Poete, commending vnto vs the maners of Cato, that is,

A.ij.

seruare

Demosthenes.
Orat. de, Cor.

Titus Liu.
M. Curtius.

Val. Max. li. 5. ca. 6.
Genutius Cipus.

Iucan Lib. 3. de
Catone.

Epistle Dedicatory.

servare modum, finemq; tenere,
Naturamq; sequi, patriæq; impendere vitam,
Nec sibi, sed toti genitum se credere mundo.

Cicero off. Lib. 1.

Also that deuine Cicero saith, that, to take away any thing from an other, or one man to encrease his owne profite, by the discommoditie of an other, is more contrary to nature, then death, then pouertie, then payne, or then whatsoeuer may chaunce to our body, or outward things. For if so we be affected, that euery one may catch vnto him selfe, and hide from others, there is loue broken, then is humane societie buried. It is more laudable therfore, and according to nature (sayth Cicero) to take vpon vs the greatest labour, and molestatio, for the conseruation and helping (if it may be) of all nations, imitating that same Hercules (whom fame, mindfull of all benefites, hath canonized, or as it were made a God) then to liue in all securitie: not onely without any griefes, but abounding also in all pleasures, and riches, beautie, and strength.

Which, so sacred a sayeng (right worshipfull) hath made me, quite forgetting my impotencie, willingly to put on armour also against ignorance, and boldly to march towardes the castle of Arte, there to offer my seruice to sciēce, the generall. Of one thing being sure, that the armour, which I carie, is most precious and costely. Wherfore, I shall humbly craue at his handes, that I may, not as an enemy, be receiued into his gates: and the, if he shall esteeme me unworthie, or unable to carie so costlie and waightie armour, I shall (right gladly) yeld the same, to the vse of some of his valiaunt Captaines: to whom my good will, now shewed by endeuour, is nothing inferiour.

Which good will in deede, is all that I am hable to shewe, and that taken away, my burden might easely presse me to the ground: for considering so ripe a world, such plenty of Artes, such profound wittes, such learned eares, and, there withall, such Tigrish whelpes of Momus pampering, if feare should haue surprised my senses, and there withall (if it had bene possible) vanquished my Zeale, to the utter ruine of these my labours, the wise would not haue meruailed at all. Good will therfore may, of right, be called the butwarke of the common wealth. For what thing is so hard, that good will maketh not easie? what is so highe, that good will may not reach? what is so worthy, that good will shall not winne? It is loue, it is truth, it is the author of all artes, and the key of all treasure saith Demosthenes. In fine, there is nothing so highe in the heauens aboue, nothing so low in the earth beneath, nothing so profound in the bowels of Arte, nor any thing so hid in the secretes of nature, as that good will dare not enterprise, search, vnclose, or discover.

And this benefite I am assured my beneuolence shall purchase, that either, be it, others shalbe moued, to fall, and fashion these my rough forged labours, or els, accēsed with the like pietie, and the rather by example hereof, which shall moue them (as it were) to emulation, to builde a new worke out of the ground, that may, in all things, perfourme that, whiche here I haue wished to haue bene fulfilled. Of both which, whether soeuer shall come to passe, my desire shalbe satisfied.

And, howsoeuer it be, I hope the godly mynded will rather prayse my beneuolence the discourage my want at all. As for those of Marius sect, which euer scorne the noble courage of Curtius: such Syllaes, as alway deride the rare vertue of Genutius:

Val. Max. Li. 5. ca. 6.
Marius, Curtius.
Sylla, Genutius.

Demosthenes.

Epistle Dedicatory.

mutius : and such Cinnaes, as perpetually laugh at the meruailous pietie of Aeliu, what should I force at all? nay, I am farre frō taking care for their endles malice, as that it shall greatly ioy me, if my vertue may shorten their liues. To the which (I hope) all the souldiers of science will hold up their handes. For although it be so, as the Poete saith,

{ Invidia vexantur opes : namq; optima livor
{ Quæq; malus lædens, odit felicia semper.

Pal. Lib. 2.

Yet vertue is a sufficient spurre vnto vs : and well it is sayd,

{ Verum age nate tuos ortus, nec bella pavesças
{ Villa, nec in cœlum dubites te tollere factis.

M. Ital. Lib. 13.

There is one thing also, which ought to be a great comfort vnto the godly minded, that is, that none do persecute vertuous proceedynges, saue onely the enemies of vertue. And enuy (saith Cicero) of force will accompany vertue. Wherfore, letting such go as retaine onely the figure of man, since Adversus invidiam nihil prodest vera dicere, & especially time present cānot say well, as Martial saith.

4. ad Heren.

Demost. 2. 1. pist.

{ Esse quid hoc dicam, vivis quod fama negatur,
Et sua quod rarus tempora lector amat?
{ Hi sunt invidiæ nimirum, Regule, mores,
Præferat antiquos semper ut illa nobis.

Lib. 5.

Whereto also Ouid.

{ Pascitur in vivis livor, post fata quiescit:
{ Tunc suus ex merito quemq; tuetur honos.

Lib. 1. Elig.

He that intendeth in deede to beare the name of a man, must first consider his birth, and secōdly his calling. For as the horse to runne, the Oxe to plough, and the dogge to hunte : euen so man (saith Aristotle) is borne to two thinges, that is, to understād, & to do, or endeuour : as who should say, we are not borne onely to have understāding, but also to put it in vse. For els in deede we shall know nothing, but liue in filthy ignoraunce : that the song of the Poete might be verified, who saith,

Cic. 2. de finib.

{ Deniq; nil sciri si quis putat, id quoq; nescit
{ An sciri possit, quo nil se scire fatetur.

Lucretius Lib. 4. d. 1
nat. Return.

Then which abhominable crime, what to be more unseemely in a man, cānot be declared or thought. But he that detesteth that, and entreth in vnto the understāding of him selfe, accordingly also imploying his time, his calling shalbe to a higher steppe : which likewise shalbe required of him. For therfore sayth the renowned Athenian Oratour, By how much thou hast a more excellent nature, by somuch thou expectest greater dignities, and somuch the rather, I iudge, thou wilt make triall of thy selfe. And surely Cicero supposeth it cannot be in a man to hid his vertue in him selfe. Which moued him to say, we are driuen to it of nature, to desire to profite many, especially in teachiug, and reuealing the reasons of wisdomē. Therefore it is not easie to finde such a one, as will not be cōtent to teach that vnto an other, which he knoweth him selfe. So that we are not onely inclined to learne, but to teach also. And truth it is in deede, for what pietie is in him, that seeth another

Demosth. 21. or. 1.
ama.

2. de Finib.

Epistle Dedicatory.

out of his way, and will not shew him of it? or what humanitie hath he that earnestly useth his tyme, in gathering together the goodes of vertue, and at length, in one instant, causeth them to perish with his body?

Demosth. Olinth. 2.

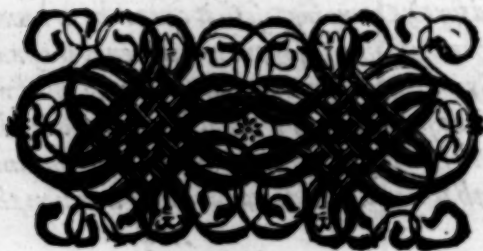
As therefore (saith Demosthenes) he is accompted great and mighty, whom euery one do iudge to make eche thing profitable to him: eue so, by the same thinges he shall be reiected, when he is conuicted to haue done all for the cause of his owne vilitie. Which thinges considered, I shall not neede to render account of my enterprise, neither (I hope) to craue the furtheraunce of the godly learned. For although, to discusse the secretes of nature, which are so meruailous in mā's body, it is the hardest point in Philosophie, yet is not the difficultie therof such, as ought wholly to terrisie vs from the searche therof: nay, rather it ought to spurre vs forward, to vse more serious diligence therein. Since the payne is not halfe so great, that is taken in the winning therof, as the vilitie rewarraeth of that which is obtained.

Darius.

And albeit this is so worthy a matter, as needeth no authours commendation, and therefore should worthely merite the labour of the learned: yet as Darius denounced that to be the sweetest draught that euer he dronke, which, in his wearie flight, he had drawne from a filthy standyng puddle, because, it seemeth before, he had neuer drunke thirstie: euen so, I hope, my labour shalbe thankfully taken, of all honest Chirurgians, considering the barren draught, that Chirurgerie, throughout the Realme of England, in this present age, endureth: and which can neuer be quenched, by the fruitefull water that floweth from the fountaines of Anathomie. Of which, I haue now endeouored to turne one cocke. Which faithfully beyng done, accordyng to my might, such as it is, I offer, before all others vnto you right worshipfull, and my most bounden, beseeching you, to accept the dedication of these my rude labours: which, were they as worthy as Galens, you might of duetie challenge. Notwithstandyng, whatsoeuer they are, good will is full in them. And that is the rest of my hope, and that is it, which your worship neuer denied. Which cherishing me, I am bold to publish this History of Man, vnder your name, to the benefite of my Christian brethren, the godlie, and toward Chirurgians of England.

Whereupon also if your worship, sometyme in Ciceroes ocium (whereto you are much addicted) shall chaunce to looke, no doubt, but you shall take great delight in the matter therof. Which, now also, of force, comitting to the sundry iudgements of infinite opinions, I cease, beseechyng vnto your worship, and all that godly shall vse me, the sweete encrease of all flourishyng vertues: and vnto the rest, the obtainyng of a better mynde in Christ Iesu.

Your worsh. in all I may,
Iohn Banister.



TO THE WORSHIPFULL THE

Maister, Wardens, Afsistantes, and fellowly Fraternitie
of Chirurgians in London: and from them to all godly, true
and zealous professours of Medicine, throughout this Realme
of England, *John Banister* wisheth the testimonie of a
cleare conscience, before the highest Auditor.



After the publication of my vnpolished
Booke of vlcers (most graue Patrons)
withdrawing my selfe into my naked
study, and deuising how best to performe
my promise therein, but first considering,
and in deede more deeply waying (ac-
cording to the state of tyme, and present
want) whiche way I might most of all
seeke the aduancement of Chirurgerie in
England, in the which cogitatio (I con-
fesse) my zeale hath long tyme turned: At
last I called to remembraunce, that the
greatest want that raigneth in Chirurgians at this day, is igno-
raunce in the subiect of their worke, waying also on the other side,
that no English Authour, which hitherto hath written, hath suffici-
ently applyed his tyme to the amendement therof. Then was I
wholly overcome in this purpose, and then did I clearely see, how
that to write Methodes or meanes to cure the affected partes of
the body, the partes them selues beyng altogether vnknownen, or
falsely imagined of, might rather be a meane to indurate the ca-
taract of inscience, then to eate it through, or take it away. So thus
I decreed to chaunge my purpose, that is, in steede of the Booke of
Tumours, which I had before promised, to compile some worke
of Anatomy, whiche might occupie sufficient scope to entreate of
all the partes of man.

But as the wanton child, that cryeth oft to handle that thyng
which his strength is not able to meddle, but rather to endamage
or hurt him selfe: Euen so did I full litle vnderstand the waight of
my burden, till I had it on my Caluissus shoulders: when as it
immediately had dissolued my good enterpryse, had not then the
flames of zeale accensed the courage of Hercules in my brest. By
meanes whereof although the same be now finished, yet so, as I
determine nothyng lesse then hereby to hinder the proceeding of o-
thers in the lyke cause, nay rather I am resolued, that hereby I
shall instigate and set forward the endeuours of such as are equal-
ly mynded, to the aduancement of the famous Arte Chirurgerie.
For, as to the building of some riche tower, or strong castle, beside
the deuisions of the woork and free Masons, there are required

Caluissus Sabinus.

Hercules.

The Epistle to the Chirurgians.

sondy inferiour Officers and labouryng persons, neither all to one ende, vse, or office, but some to digge, some to square stones, some to carie them to woorkemen, &c: Euen so I, not hauyng the knowledge to deuise, nor the pollicie to digge for the best stone, neither the skill to temper the mortar, nor yet the reason rightly to square the stone, notwithstanding because my zeale is nothyng inferiour to the chiefe Masons, haue had the will to gather the stones, and lay them by the woorkemen, now also hoppyng that some cunnyng Mason will reache his hand to my heape, and lay of the stones of my gatheryng to the buildyng of this famous tower of health: since I shall conceiue incredible felicitie, if I may hereafter, in viewyng this renowned buildyng (for so I hope surely to see it) cast myne eye vpon those stones whiche my homely handes had so rudely congested, and see them cunnyngly wrought, and aptly applyed to the buildyng.

Into which consideration of me I first beseech you (most graue Seniors and Christian brethren) to enter, before you take any occasion to accuse me of temeritie, whiche crime I had worthely incurred if zeale should not mediate my cause, so do I hope, that you will not onely fauour the frutes of my labours, and adde to them your helpyng handes, but also be (in my behalfe) the shield of Pallas, agaynst such Serpentine tounges as duely seeke to prophane of all godly endeuours.

But to returne to my first determinatiō, whē I had wholly giue my consent to this end, I might see first a farre of, what sondy & great mutatiōs nature hath vsed in y body of mā since Galen wrote in Anatomy: and omitting diuers old writers, whose workes had not all equall successe, I came at length to Vesalius, whose whole worke seemed as tedious as his Epitome ouerculled & short. But whē I saw Fuchsius to haue extract a notable Epitome out of Vesalius & Galen, I had thought to looke no further till Collumbus appeared in my sight: whose labours then reuoluyng, and seyng him in some thynges vse sufficient prolixitie, as in his Bookes of Bones and Muscles, & in other causes to be somewhat brief (because Vesalius had sufficiently handled them) as in the nutritiue partes, immediately I refused to bynde my selfe to any peculiar translation, chusing rather to picke a posie of the chiefest flowers frō all their Gardens, the opinion of Fernelius and others not beyng vtterly refused, as throughout the History is diligently noted.

And somuch the rather I esteemed this the best, because that way I perceiued I might both more playnly describe the partes to the iudgement of the Reader, as also vse sufficient scope vpon the dissention of Authours in the most notable causes. These considerations vsed, I set foreward in this matter, purposing (to speake briefly) to penne it in fourme of a History, least the Volume of the
booke

The Epistle to the Chirurgians.

booke should ouer hastily encrease, whereby I might be inhibited to vse requisite prolixitie in conuenient causes.

And now finally beyng finished, as I may, not as I would, I (the least of the number) do offer the first frutes thereof vnto you, the auncient fraternitie of Chirurgians in London, and consequently from you, to all Godly, and single professours of the Arte of Chirurgerie, throughout this Realme of England: into whose myndes, I beseech God to inspire the grace of his holy spirite, that we may all (yet at length) with one consent together, endeouour, study, searche, knocke, and call at the gate of Gods mercy, for the guiding of his holy spirite, that, in all our proceedinges, beyng thereby protected, we may seeke the aduancement of the glozy of God, in healyng our afflicted brethren, whereto his diuine power shall (so oft as it pleaseth him) suborne, and appoynt vs Ministers, that (I say) with the testimonie of a cleare conscience, we may render our bauntaged talentes vnto the high Auditour, in the day of commyng, which, we know not how neare, approacheth.

As for you, O ye chaffe of the earth, ye stinge of the Godly, ye Impes of Hell, and children of wrath, you (I say) that, vnder pretence of the sacred Arte of Medicine, deuoure the sheepe of Gods pasture, slea the laboures in his Haruest, and denye your Lord the frutes of the Vineyard: since no warnynges may admonishe you, no exhortation amende you, no lawes bridle you, no punishmentes tame you, nor any feare of God sinke into your brestes: behold, all the true professours of Christ Iesus, and who carefully endeouour Godly to discharge their functions, do cry for vengeance from heauen bypon you. And I (in these my labours) from the depth of my hart renounce you, hoppyng assuredly, that from none of the flowers of this Garden any of you shall take oportunitie to sucke that, whiche may maintaine the infection of your pestilent wretchednesse hereafter. If therefore I haue any where frequented a phrase aboue the common vse of our Englishe language, or vsed woordes litle different from the Latin, esteeme the same to be done onely for your cause, since (as much as in me lyeth) I haue endeouored euery where, to shade the kernell with a harder shell then you shalbe able to cracke. Away therefore you Wipers. Let these my simple labours, what soeuer they are, be entertained in the handes of thee true, vertuous, and honest Artistes, and professours of Chirurgerie, that my expectation may be fulfilled, Arte rightly aduanced, and God duely worshipped.

And now returnyng to you agayne (most Godly gouernours, for whose sakes I was most encouraged to perseuer in this enterprise) considering your Godly affection towarde me heretofore, and that it hath euer pleased you to esteeme of me, farre more, then the vttermost of my power, at any tyme, may merite, I thought

The Epistle to the Chirurgians.

It not onely the office of pietie, by this meanes, to pricke forthward the myndes of some of the learned sort, but also to commit this vnto you, as a pledge of my vnfermed zeale to the Arte of Chirurgerie, and consequently to you the chief pillours thereof in this Realme: which, beyng thankefully receiued of your gratefull hartes, may testifie for me, that inwardly I wishe, whiche outwardly I am not able to manifest.

Haue now therfore this History of Man, picked from the plenty of the most noble Anathomistes aboue named, wherein I haue earnestly, though rudely, endeuoured to set wyde open the closet dooze of natures secretes, whereinto euery Godly Artist may safely enter, to see clearly all the partes, and notable deuises of nature in the body of man. From the female, and that (as I suppose) for sundry good considerations, I haue wholly abstained my pene: least, shunning Charibdis, I should fall into Scylla headlong. No more, but vouchsafe to accept Sinxtes faythfull offer, and protect this handfull of water, from the pollution of straunge beastes.

Farewell from Nottingham.

Tyme



THE PROEME.



Tyme, the generall rust of the world, which weareth, eateth, consumeth, and perforateth all thynges, hath denied that the preceptes of the deuine parentes and progenitours of Phisicke, should for euermore remaine insoluble, or free from all future chaunge: els what should withstand, whereby the workes of Hipocrates and Galene should not suffice all posterities that come after? For what thyng notable haue they not noted? what secret so daintie, that they haue not vncouered: yea what misterie so couert, the doore wherof they haue not opened? And yet notwithstanding, these deuine Oracles haue not taken from posteritie all occasion to write, neither shall the bookes which hitherto are written, do the like to those that come after. But ech age hath his tyme, eche nation his nature, and ech nature his property.

Albeit, this excellencie we ascribe to Hipocrates and Galen, that neuer any hath bene their equals, and that from their fountaines flow the springyng streames, that nourishe Phisicke for euer. So that what good thing soeuer we haue, or atcheiue, we are to consecrate the same vnto their honor and prayse: and what worke soeuer is published, if the same be worth the reading, we owe it wholly vnto them. What the (you will say) is the cause, that their workes suffer in these dayes such sundry contradictions, especially in the partes of mans body? It is answered a litle before, how that tyme, nature, and nations must be respected.

For first, that the magnitude of our body is greatly diminished, it is a thing in readynes to euery man, not onely by the authoritie of auncient writers, but also that dayly, and (as I suppose) throughout the world, the stature of mā in all pointes decreaseth: especially in those regions: where as matrimonie is ouer liberally, & before the iust age, permitted. Who is so ignoraunt, to whom the Scriptures haue not ere now testified, how much longer then in these dayes, the age of mā hath bene in times past? how abundantly do our bodies testifie, how sondry of the inner partes both in magnitude, number, figure, and situation, do differ from those in others of other regions? neither are the same in all our bodies in these dayes, as, in elder time the auncient Anathomistes most commōly obserued: do not their writynges, and our bodies make it manifest to all liuing? but to what end? that it might not seeme to vs incredible, that in men of euery region, like as in beastes, yea in the plantes them selues, is either some thyng peculiar from others, or els some certaine mutation from the first nature to haue chaunced.

As, to come first to the exāples of beastes. In Ciria the sheepe haue tayles a cubite broad, and the goates eares ix. inches in length. What meruaile is it when as the ramme and the ewe, whiche both in Affrica

B.ij.

beare

Isr. 40. in 10g. Pre.

Ph. Lib. 7. cap. 6.

Isr. 58. libid.

Arif. Lib. 3. hist. ca. 28.

The Proeme.

beare hornes, in Pontus a prouince of Scythia, to haue therefore none at all? As other where sheepe, so in Cilicia goates are clipped. The oxen, sheepe, hartes, and such others, are greater in Ægipt then in Greece: but for that the dogges, wolues, foxes, hares, and hawkes, are greater in Greece the in Ægipt. Oxen in Scythia through cold possesse no hornes. Oxen in Phrygia haue hornes that are mouable. The Isle Ithaca is destitute of a hare, like as the field called *Ager Lebadicus* of a moule, and Sardinia of a wolfe.

If histories be to be beleued, then these are true: if not, what do we with auncient testimonies? why credite we thynges written, or beleue any thyng to be true which our owne eyes haue not witnessed vnto vs? yea let vs reiect the monumentes of our elders, detract their doynge, and wholly obliterate their writynges. And if the bookes of Aristotle, Plinie, and others most famous Historiographers, be worthy to be opened, the are beastes in Asia, all more cruell, in Europe more stronger, and in Aphrica more diuersly fourmed. But, to speake more appertinēt to the body of man, these aforesayd varieties, obserued of auncient writers, arguyng onely vnto vs, that, as beastes are bred diuersly in eche nation, and accordyng to the nature therof, so to be in men some dissimilitude, & by the same reason, was not denied. Enery one knoweth that the Moores haue onely white teeth, but blacke skinne and nayles. But it is not a thyng so commō that they, and also the inhabitantes of such hoate countreys, are without seames in their Sculs, which with vs is a thyng somuch approued.

Cor. Cels. Li. 8. ca. 1.

But, omitting those natiōs which differ a litle amōg the selues, let vs come to those which more manifestly vary in figure. In Asia are a people named Macrocephali, hauing very long heades, though first of custome then after of nature: of custome, because they kept the compressed heades of their children, swathed so, till some consistence of yeares grew on them, which thyng afterward made their children beget the like, though in tract of tyme, and through their negligence, nature amended that fault. The people called Phasiani, inhabityng a marish ground and rayny region, are in figure from other men very diuers: as, of mighty stature, and marueilous corpulēt, so that neither veynes, nor ioyntes are in them apparaunt, alway bearing a yellow colour, like persons afflicted with the iaundes, and in voyce most base and terrible.

Hipocr. de. aere.
Aquis et. locis Lib. 1.

It is straūge to vs that womē haue beardes, albeit not so euery where: for in Caria it is a thyng familiar: whereas some of them beyng a while frutefull, but after widowes, and for that suppressed of naturall course, put on virilitie, being then bearded, hearie, and chaūged in voyce. Shall it be counted a fable that toucheth the transformation of one kinde into an other, as the Male into the Female and so contrariwise? surely Plinie saith, No: since him selfe to haue sene a woman chaūged into man, in the day of mariage, he playnly auoucheth. And agayne, a child of a yeare old, from a mayden to a boy. There are certaine wild men whose

Hipp. Lib. 6. Epid.

Lib. 7. Cap. 4.

fecte

The Proeme.

feete are turned backward on the legges, and some of them hauing viii. toes on a foote. What shall we say of the Cyclopes, whose eyes haue in the two apples or balles? I omit to speake of those that haue but one eye; of those that are both Male & Female: of such as haue heades like dogs; of the people which haue no heades; of them who with one legge couer their whole body: of those without mouthes; and so forth of such sortes many, which are in Indie very familiar.

True it is also that the Scythias, named Nomades, are very corpulent, and fleshy, their inferiour bellies euer slippery, & their ioyntes through moysture very weake, in somuch as they are euer found to haue applied fier to their shoulders, armes, handes, brestes, hippes, and loynes, for no other cause, then for the naturall moysture and softenes; for thus if they should not do, they would not be able to hold their bowes, or cast their darts, for softenes of their ioints, through slippery humors so obnoxious to luxation. And it is no more truly written of the Pygmeias, then meruailous to our vnderstandyng, since they are of so small stature (for they exceede not in height the length of a cubite) that dayly they are preit to put on armour agaynst Cranes.

These Argumentes, and sundry such others, which Iacobus Siluius hath gathered together, and therefore I thinke them also most fitte for this place, may not lightly moue vs, to beleue likewise that in our bodies sometyme sundry mutations do happen.

In places either very hoate, or very cold, men are in countenance and maners fierce and cruell: notwithstanding they that inhabite hoate places are more fearefull, though wiser: and they which dwell in cold, ströger. The Asians are fairer, greater, more gentle, feareful, effeminate, and vnapt to warre for the temperature of the ayre and lawes.

The Europeans contrariwise are in magnitude much different amög them selues, cruell, of hauty courage, bold, vpright or honest, and giuen to warre. They differ (I say) in magnitude, and fourme, through the mutations of the tymes of the yeare, which there are great and often: as strögh heate, yehemet cold, much rayne, long draught, and strögh windes, whereby euery where, sundry, and many mutations are made. In Asia so the other creatures, and all plantes are more happely produced then in Europe. Many kyades of men are in Europe, which in magnitude, fortitude, fourme, and stature are much different among them selues. The cause of which varietie is somewhat before touched, but Hipocrates more clearely doth describe. As they which inhabite a place or region full of mountaines, rough, high, and watty, and haue with the many mutations of tymes much differet, it is requisite that of their own nature be made many fourmes of bodyes, and such as are labourfome, exercised, and strong, and such natures also to be fierce and cruell.

Agayn they which reigne in places more medowy, or groudes flow- yng with herbes, and hoate, & their windes more hoate the cold, & vse hoate, or warme waters, these persons are not high, but rather broad,

B.iiij.

with

Philib. 7. cap. 2.

Hipp. Lib. de aere, Aquat. Locis.

Lib. 1. Hist. cap. 15.

Iac. Sil. Hist. Praef.

Sec. 14. Prob.

Hipp. Loc. cit.

Loc. cit.

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with blacke heares, and they more of dusky colour or browne, then are bred in other places, and of their owne nature lesse flegmaticke then cholericke. But they that inhabite a high and pleasaunt place, not rough, or windy, and haue good waters; these are large in body; straight, and like vnto them selues, endewed with witte and myndes more milde and gentle: like as they of thinne, barreine, and not watry and naked places, neither haue the mutations of tymes temperate, are hard bodies, not great, rather yellow then blacke, wayward, irefull, bold, and obstinate in opinion. For where often mutations of tymes are, and those also much different, truly there also may you finde their fourmes, maners, and natures greatly disagreeing. The regions wherein tymes and waters are chaunged, or do varie, the bodies there also do vary: since alway, or for the most part, the maners and fourmes of the people do imitate the nature of the region.

Ulig. de Mecen. ob.

If then the varietie of times doth so transmute, and chaunge the state of mans body, as that worthely sayth Virgill (although perhaps he had not altogether this sence.)

*Tempora dispensat usus, & tempora cultus.
Hac homines, pecudes, hac moderantur aves.*

Iac. Sil. Loc. cit.

It is straunge to see how sturdely some strue to deface those, which, full of Naturall pietie, write the truth of their owne tymes. Why, they will haue it that there were neuer Amazones in Scythia; because perhaps there are none now to be founde. Aristotle erred, for saying there were no Asses in Fraunce, Ponte, and Scythia, because now in those countreys they abounde. Hipocrates he is reprobued, for affirming no kinges to be in Europe, though at this day it possesseth plentie. What is it, that in the tyme of Esculapius were no distillations nor inflations. Hipocrates saw no rigour without a feuer, though in Galens dayes it chaunced often, but now a dayes most often, especially to womē, through a more intemperate diet.

Plat. Dial. 3. de.
Repub. li. de. caus.
simpt.

Aph. 28. 29. 30.
Lib. 2.

Lib. de. coacis pra
not.

If we shall stand vpon diseases purchased by tymes, yea yet dayly, by the immoderation of diet, when should we draw to an end. In the age of Galen Eunuches did incurre the gowte, though long before, and in the tyme of Hipocrates it was not so. Also the gowte, pleurisie, and inflammations of the lunges were not wont to chaunce before the age of xiiij. yeares, but where standeth it at that stay now? who hath not sene them all at younger yeares? yea some of them at x. ix. yea (though the more meruailous) at viij. yeares of age. The which thyng I dare boldly testifie, since, in Nottingham, in An. 1574, it pleased God to make me the instrumēt of health to diuers childre, of the ages before recited, finding no present remedy (for to diuers in the beginnyng I assayed other helpes in vayne) but Phlebotomie, notwithstanding their tender yeares, the disease beyng the Plurisie, and the tyme of the yeare the spring.

What Artist of experience in these dayes knoweth not, that women (for the most part) do beare males aswell on the left side as the right, and their

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their females aswell on the right side as the left: the transuerse processes of the Vertebres of the necke appeare vnto vs alway as if they were clo-
uen, though to Galen the last of them was seldome so. Os Sternon Gal-
len, with the elders, obserued perpetually to consist of seuen Bones, but
we in these dayes neuer inuent the number so large: albeit that we ne-
uer finde the number certaine.

1ac. Sil. Loc. cit.

What then? shall we finde the number of the Vertebres alway one? he that hath so the happe, let him set it downe. For my part, amongst those very few bodies, which, also in very few yeares, though to my cost, yet for the very zeale I haue had thereto, I haue dissected, I haue found some of Galens Sceletons in sundry pointes. It may fall out to be no new saying, that almost in all bodies, some varietie is to be sene.

Much meruailous shall it be to him that vseth dissection, to see such sundry and often varieties: yea, setting aside monstrous shewes, the Anathomist shall see in his own region, and in few yeares, sundry notes of new shapes in nature, not so straunge now, as worthy the notyng.

To prættermite those whiche Vesalius obserued, because they are confused, let vs come to the most notable, by others descriued and set in order.

Collūbus, that Anathomist of worthy fame, beginning at the head, runneth through the whole body, notyng what new thyng he hath in any particle obserued. So that first he excuseth not the head, but that he hath sene it sometime without seames, sometime with sundry seames, and those keepyng diuers orders, to haue bene compact together. The teeth in diuers numbers: and the neither iawe growne to the vpper. Of the necke, the first Vertebre inseparably growne to Occiput: the number of the Vertebres of the necke sometye fixe, and sometye eight with the like varietie at sundry tymes of the other Vertebres. Of ribbes xxij. xxv. and xxvj. Os Sternon consistyng of two, three, and iiij, Bones. The thigh to haue ouergrowne the legge into an incredible tumor. But aboue all these it is notable that he reporteth of a Sceleton, whose Bones all, from the head to the toes, were ioyned together, so that the partie in his lyfe tyme, beyng old, could moue no part saue his eyes, tounge, brest, bellye, and yard. I passe with silence, the aboundaunce, or want of Muscles whereof he remembreth, and the sundry trases of Veynes, with their want, or extraordinarie diuisions. Of the kidneys he sawe the singular number, although that a greate one, and Splenes so large, as that eche one in waight peised twenty pound, beyng outwardly ouercouered with a Cartilage. So vlcers, and tumours in the hart. So the hedge that distinguisheth the Ventricles of the hart, Cartilaginous. It was straunge to behold Pericardium, the enclosure of the hart, wantyng. What then? he obserued stones in the lunges, liuer, Vena Porta, vrinarie wayes, in the bleddar, Hemorroidall Veynes, and in the nauell of sundry straunge abscesses, in diuers bodies obserued, the same authour also remembreth. But among all thynges that he hath no-

Col. lib. 11.

B. iiij.

ted,

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ted, this one seemeth most notable, whiche he reporteth of a woman, who had outwardly a perfect shape, & onely the necke of the matrice, but no matrice, seminarie vessels, or Testicles at all: and so oft as she vided the company of man, (which she did often) she in meruailous sorte moued her selfe.

Lib. de. Var. Corp.
dific.

Leonard. Botall. Lib.
de catarrho.

But why stand I so long vpon the obseruations of Columbus, an Anatomist of such yeared experience? come we to them that scarce dissected two for his twentie, for it is more rare that they haue inuented such nouelties.

Iacobus Siluius in his tyme sawe sundry illusions of Nature, both in men, women, and children: in the liuer, spleene, kidneys, ventricle, midreife, intrels, veynes, and matrice. All which, to penne particularly, I omit, together with the straunge, or rather monstrous kidneys which Bottallus mentioneth, and hath openly depainted: as also his obseruation of the foure Officles or litle Bones in the diuision of the brayne: since it hath bene my happe to see much in few dissections.

And first (touchyng the Sceleton) in the number of Vertebres: as sometyme fixe in the loynes: sometyme foure, sometyme fieve in Os sacrum: and sometyme three, sometyme one in Cauda. Among the inner partes, I haue obserued the liuer twise deuided into lobes. To the outside and bottome of the matrice I haue found a certaine mole, or masse, white in colour, and hard, or in substance Cartilaginous, in fashion like the Testicles, as yet within their purse enuolued: saue that it wayed almost ij. pound. This being cut, contained aboundaunce of slimie matter, which at the first brust forth thinner, though at last, very thicke and slimie in deede. Once, in an aged Gentlewoman I searched in vayne for the right vetricle of the hart. And once in the hart of man I found a thing notable, and which these before named haue made no mention of, that is, a bone in the hart, situated at the endes of the vessels inserted thereinto, as in the History of Bones I haue more copiously handled. Besides in the same old man (for so he was in deede a man prest to the ground with dayes) I saw one of the vrinarie vessels, which, for the space of an intche (or more) in length, had wholly possessed a Cartilaginous substance, which seemed still to encrease.

Lec. cit.

But here perhappes some are ready to obiect, and say, why what then? do you intend to reiect those authorities which so oft you haue here alledged, nay, not alledged, but rather out of whose mynes all this treasure is digged? no, but I could wishe with Siluius that euery one might be more zealous to searche the truth, then busie seekers to finde oportunitie agaynst their elders. And those in deede the parentes of all Phisicke. For if in any thyng they disagree from the bodyes of other regions, surely these rehearsed Argumentes are sufficient to proue the same farre more worthy to be imputed to the varieties of regions, and chaunge of tymes, then otherwise, with foule obloquie to spurte our elders, whilst we our selues in the meane tyme,

as

The Proeme.

as maleuolent detractours are publiquesly denounced. *Siluius* therfore wisheth him that findeth any thyng otherwise then Galen hath written it, to ascribe the same as a certaine addition to Galens Anathomie, els frendly to admonish the reader therof.

As for my selfe, I confesse I haue in sundry places cited, and as it were enrolled Galen in sundry errorrs, yet not by halfe so oft as my authours haue prouoked me: for *Vesalius* chiefly, and *Collumbus* (as I suppose) haue spared him in no place. Which hath excited me (freedly Reader) familiarly thus to warne therof in the begynnyng, that when thou readeest them, thou mayest rightly know from whence they come.

In the meane tyme to come to the matter proposed, I commit to thy diligence in the begynnyng the History of Bones, the frame of the body, wherein (of truth) attentiuenes ought to be vsed, both to carie in mynde, together with thy eye, the direct sense of the present described part, or rather (if it may be) to conferre the same with the Sceleton it selfe, as also because it is an introduction to the whole History of Man, and may be called the keye of knowledge to Anathomie: without the perfectiō wherof, the rest is not onely obscure, but almost vayne at all to read. After the Bones, ensue the Cartilages: then

the Ligamēts: after those the Muscles: next the Muscles the

nutritiue partes: and next the nutritiue the genera-

tive partes. Then at length the spirituall mem-

bers: and finally the animall. To these I

haue added a ninth, least (otherwise)

the mārey, Periosteon, and

the heares should haue

bene sought in

vayne in the History of Man. All these to my power,

I haue saythfully, and therewithall sufficient

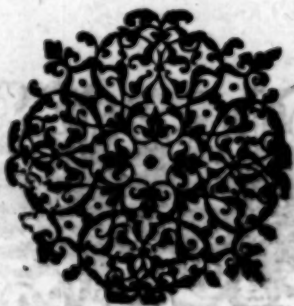
briefly, compiled together. Now re-

steth no more, but read,

and enioye.

*.i.

¶ Iulius



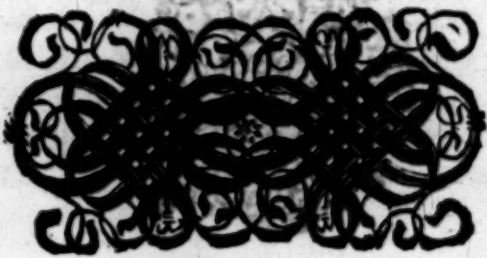
Julius Borgarucius amico suo

Banisterio. S. P. D.



Va olim de fabrica humana ab antiquis Græcis Lico, Herophilo, Erasistrato, & ante eos Hypocrate, postea à Galeno summo viro & Philosopho præclarissimo græcè fuerunt illustrata: tandem à recentioribus Curtio, Sylvio, Vesalio, Faloppia Latine posteritati cõmendata, tu Anglicè reddidisti perspicua facilitate, ordine cõpositivo, maxima doctorũ virorũ admiratione. Legi integrã tractationem de ossibus, Ligamentis, & Cartilaginibus, quam non solum probavi, sed, ut omnes intelligerent, qui de re medica iudicium aliquod ferre possunt, enixè contendì, quàm benè de republica tũ agendo tũ meditando nostra merearis: de Musculis, Venis, & Arterijs reliquum, ut audio typis excudi, adhuc non vidi. Sed si ex unguibus Leonum quis facile agnoscat, ex iisdem tanquam sint prologomena maiarum rerum, vide te operam & industriam collocasse in explicandis naturæ miraculis non exigentiam quam Theoricam Anatomes partem nunquam assequi potuisses, nisi resolutoria methodo praxim adjunxisses, & nocturna diurnaq; manu versatus esses in separandis, incidendis, distinguendis partibus humani corporis, quibus non modo quo pacto organica à similaribus, sed qua substantia, qua connexione, & quo usu inter si distinguantur diligentissime abs te fuit adnotatũ. Hoc tamen video: ut de suis libris Physica auscultationis Aristoteles Alexandro magno literas dedit, Anglicum istum opus tuum Anatomicum doctis tantum vel in arte plurimum versatis usui futurum. Nomina enim dum vertis Græca & Latina, & dum ex lucidissimis fontibus hauris perennes aquas, qui vel illa non callent, vel de Helicone nunquam degustarunt, illotis manibus accedent ad perscrutanda naturæ miracula, & recedent magis ac magis coinquinati. Tu probis tantum & filiis artis dum studes placuisse, non est cur vulgus aut formides, aut imperitia malevolorum (homine imperito nihil quicquam iniustius) studeas velle satisfacere. Cura itaq; valetudinem tuam, & nos ut facis ama.

Vale.



*William Clowes Chirurgical, to his
louyng frend Iohn Banister.*

THy noble skill in Surgerie (for so we call it heer,) Thyne honest lyfe, and faythfull hart vnto thy countrey deer,
Well known to me (good Banister) thy poore and loyall frend,
I would I could in skilfull Verse so cunningly commend,
As well I know it well deserues both praye and prayse agayne.
And sure I am that this thy toyle, and heere employed payne
For paynting out the frame of man, in this our mother tounge,
Culd out of learned Latine workes, heerehence hath onely sprong
That thou thereby thy countrey men mightst further much in skill:
And geue them light that earst they lackt, as sure (I hope) it will.
Thou wrightst not for the learned sort (I know) that were but vayne,
But hopest to helpe the meaner folke. And so, I trust thy payne
Shall wyne such prayse of skillfull men, as paynfull toyle may craue,
And as a mynde that meaneth well of duty ought to haue.
If error ought hath scape thy penne, or paynter hapt to hault,
Let that no whit dismay thy mynde. None scapes deuoyd of fault.
Where skillfull men geue iust reproofe, with carefull payne amend it.
Regarde not much the rascall sort that blyndly reprehend it.
For as we know that men be men, and easely apt to stray:
So Enuyes Imps do bend them selues to slander euery way.
My selfe of late haue tryed in that so small a worke of myne,
Wherein I sought no prayse to winne, nor get a name deuine,
But onely to content my frendes, whose earnest suite to craue it,
I could in no wise fatishe, but so, as they might haue it.
Yet some I found with readier tounge forthwith to reprehend it,
Then fraught with skill to frame the like, or ought perhaps to mend it.
But who so ready to controll, or sit to carpe, and clatter,
As he that hath the dymmest sight, and iudgement in the matter?
What if I did somewhat omit? what if the Print were lame?
What if I meant at leasure more to haue enlarged the fame?
How euer it be, I neuer meant to please eche curious hed,
Syth who so toyles him selfe in that may bryng a foole to bed.
Wherefore my good and honest frend referre the whole successe
Of this, and all thy toyles to hym that will thy trauailes blesse.
And as thou hast by labours great, obtained a grounded skill,
And settled sight in Surgery, so I exhort thee still
By skillfull workes the fame of such a facultie to raise,
Wherein we know most famous Clerkes haue, often, spent their dayes,
And trauailes great: in hope thereby immortall fame to winne,
Whose worthy workes do well bewray their paynfull toyle therein.
I speake not of the famous Greekes, and fathers of the Artes:
Nor Guidoes workes, nor Vigoes workes that write of other partes:
But of the whole Anathomie Vesalius pasing well.
Collumbus and Fallopius workes, how much they here excell.
Whose skillfull penne haue paynted seach part and peeces of Man,
As none lookes now to better it, (I thinke) nor euer can.
Whose lastyng fame no age shall once be able to deface.
Among the which (good Banister) I wish to thee a place.
And so Adeiwe. And thou (good Reader) pardon I thee pray
My penne that in this homely ryme hath raungd to farre alray.
But three fold wayes enforst thereto. For zeale vnto my frend,
For wronges of myne. For my professed Art. And so I end.

*.ij.

De Morbo Gallico.

¶ The

The fore part of the Bones.



OF THE HISTORY OF MAN, the first Booke.

OF Bones, the frame of the Body.



AS the good and expert Architect, hath a singular care, first in edifying his house, to be well advised of the maner of his foundation, and hereby framing of his Timberworke, before he lay on Brick, Tile, Slate, Lime, or Plaster: So it becometh vs, in searching the true Secretie of this Mysterious Science, and body of Man, first, before the partes supported, distinctly, and deliberately, with diligent care, to consider the partes supporting. And the reason is good. For if you doe not first exactly examine, and to a sufficient fulnes feede your appetite, with the diligent peruse of this History of Bones: you shall finde the rest of this booke, not onely in reading vnusurery, but also to your sensible vnderstandyng very obscure. Wherefore of the Bones of mans body, what they are, and how they are contriued, and combinatied, after all manner order of knittng, & articular motion, the good Whisler (sayth *Galene*) ought not to be ignorant. But amongst all things to the arte of Medicine appertinent, that thing that is according to Nature (as the scoape whereto we ought to cleaue) we must study to conserue and know. The Bones therefore, by very right we call the foundation of the body, since they not onely make firme the partes, but also sustayne and support the body. When that we in this our first enterpryse intreate of Bones, it neither seemeth boyde of much authorized maintenance, neither yet frustrate of the splendant sparke of reason, which shall light ech mans iudgement into the right conduced way of truth. Wherfore are the wordes of *Vesalius*. All the partes of mans body are either Similar, or Simple with sence, as are Ligamentes, Fibres, Membrans, Flesh, and Fatte: or els Dissimilar, or Instrumentall, as the Veine, Artery, Sinew, Muscle, Finger, and other Organs of the whole body: which are made so much the more instrumentall, by how much the greater store of Similar partes with the instrumentall are compounded. As for example, the handes & head &c. The Bones are of all the partes of the body most hard, & dry, of earthy substance, cold, & boyde of sence, the tooth onely excepted. But here you must vnderstand, that they are not accounted boyde of feeling, because they are most of y^e terrestriall element, but because no portioⁿ of liues, which are the immediate organs of sence, is in their substance disseminated.

Neither was it the mighty pleasure of God (whom we call Nature) nor any parcell of his decree, that the substance of the bones at all should be made sensible, as any reasonable man must of force confesse, if he note but how the whole mole, and pack of members are sustayned by them: who with their many motions, do carry, and retarry all the other parts of the body with them, which argueth, that if they were (as some say) delighted with the perfection of feeling, then the moitue vertue of the members would by exceeding payne be taken away, or els at least frustrate. Wherefore it is odious to heare them, that blushe not obstinately to affirme, that in bones is conteyned a singular sharpnes of sence, when as neither reason can rule them, nor experience satisfie them. For belike

E. f.

they

Fach. II. I. c. 2.

Ex V. 61.

The reason why the Anatomy of bones occupieth the first place,

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the first place,

The first Booke of the

The usefulness of
such querey the
to an honorable ad-
surditie, as will
needes make the
bones to sele.

The experience of
Chirurgians, co-
sareth this error,
nothyng more.

Perioleous.

The sensibility of
Perioleous not edo-
wred, was the
cause of their er-
ror.

Perioleous abaced
no sence is disce-
ned.

The first differ-
ence of the bones.

The second differ-
ence of Bones,
from their mag-
nitude.

The third differ-
ence of bones, the
shape of their use.

Some great
Bones have no
manifest hollow-
nes, as the bones
committed to os
sacrum, os sacrum
it selfe, and the
Scaple bones.
Some bones are
small, but notably
excaved, as of the
fingers.

The Sesamiz, the
bones of the nose,
& Ossicles of the
eare, are hollow
by nature, or so-
lid.

Col. cap. & lib.
predi.

The Brachiall
tooth is the pro-
trusse eminent fra-
vins, in the wrist
of the hand.

The use of the
holes and poro-
sities of Bones.
Now those that
have no holes
without are now
ended.

What an Appen-
dage is.

they will either proue that the Bones are the originall of Nerues, and so conse-
quently of the brayne: or els that the Bones are produced and made of the mat-
ter of the brayne, and so to be sensible as the Nerues, whiche are the organs of
sence, as shal sufficiently be declared vnto you in their proper description. But
yet further to confute their vnshamefastnesse, the good Artiste, who in his lyfe
tyme, & dayes of experience, * either scaleth, cantrizeth, or seperateth Bones, is
able to testifie abundantly that after he passeth (in his operation) Periolecon,
the party is no longer vered, with such payne as appertayneth to the sensible
partes. This *periolecon*; (for so it is termed of the Grekes, the * Latines haue
not knowen it) is a certaine Membrane, that entwappeth, & cloatheth the bones,
by the benefite of which Membrane, and not of their owne proper Nature, the
Bones are supposed to feele, although in deed they doe nothing lesse: for that once
* abaced, or taken of fro the bone, neither can they by sence afterward discerne,
whether you cut, burne, deuide, or otherwise at your pleasure handle the. Ther-
fore it is a shame if we otherwise affirme: but with *Gal. Vesal.* and *Col.* conclude,
that Bones of their own proper Nature are altogether destitute of sence, except
(as I sayd before) the teeth onely which are appoyued sensible, as experience our
Scholeraistres teacheth vs.

Now as touchyng the proper differences of Bones * this is the first, that
they differ not only in names (when as euery one chalenge to themselves proper
names) but also in magnitude, some being * small, and others greater. Agayne
in fourme, as some long, some short, diuers triangled, others quadzangled, * &c.
Or otherwise acco:dyng to the figure: as smooth, or rough, defended with pro-
cesses, or hauyng appendances: some distinguished by commissures, others also
otherwise. Whoeuer they are distinguished by their uses: Since to one onely
function or common office, all were not ordayned, which argueth also the great
diuersitie of their fashions & fourmed shapies. For some are playnly hollow, nei-
ther alike: but some of them with more large scope, others also straiter, yet not
pioning the bone either larger or lesser thereby: when as * some being great haue
no manifest hollownesse in them, as for example: The bones committed to os Sa-
crum, or Sacrum it selfe, the Scaple bones, & others named in their places. Some
agayne are * small, but much hollow, as the bones of the fingers contrary to Ga-
lene; as we will proue in their proper place. *Andreas Vesalius* also supposed
that neither the bones of the nose, and * Sesaminz, neither the little Ossicles that
constitute the organ of hearing, should be otherwise then made of massiue Soli-
ditie: Which (notwithstanding) *Collumbus* doubteth not to denye: for proue
whereof (sayth he) breake one of them, either greene, or dyed, and you shall finde
the substance therof spongie, not vnlike a thicke Pumme Stone. And these bones
also although they seeme so Solid, shew in the outward partes of themselves cer-
taine holes, some greater, and others lesse, as is to be sene in the Brachiall teeth,
and many other bones of the fingers: which the Diuine creato: hath comma-
ded to be Perforated. Therefore euident ynough those holes are not in bayne, they
giuyng place to the veines and blood for nourishment, as also to the Arteries for
their vitall heate: whereas such as haue no holes, to admit within them, either
veines or Arteries, such we say are nourished, and fed by the partes adiacent.

Now forasmuch as in this our narratio of bones, diuers straunge names, &
such as to the simpler sorte are altogether vnknownen, be here & there scattered:
It shalbe very conuenient before hand, briefly to table out an expositio of them:
That thereby the reading of such in their places (being now first cracked and sha-
led from their obscure Huskes) may be more perspicuous, and pleasant to your
contemplation: which otherwise would be loadsome, and tedious.

And first to begin, we will say what is vnderstood by this word Appendage,
which

which the *Greekes* call *επιφύσιον*. It is nothing els, save a bone springing to a bone: or rather an addition or coagmentation of some bone, obtaining a peculiar circumscription, yet not being a true portion of that bone, whereto it is committed. In young creatures therefore it is easily discerned, but in older and greater more hardly: for trial wherof, if you boile the bones of a kid, or lambe, or beale, you shall easily see certaine portions, & endes of them, to deuide, either by them selues, or els with small constraite. And those Particles so annexed to the bones, are called Appendances: which (contrary to the mynde of Galen) we must needs affirme to be softer then the bones them selues: since we delite oft tymes with our teeth, to plucke the Appendances of small Bones, & to chaine of them in our mouthes: for the pleasaunt iuyce that often they retaine. Which contrariwise we cannot do to the bone. Neither are they lightly to be losed, or denuded from the bones, by euery motion: for that nature hath so well provided for the turning of the ioyntes, with such softe and supple Cartilages, as thereby in the motion of the bones, no occasion can be giuen, by any strainge to inturie them. The vse and chief commoditie of them, is excellently rectified of Columbus: or rather inuented: and so as no man hath fully hitherto iudged: although the thyng be worthy knowyng, and exceeding necessary. And one thyng among many others he testifieth, that nature hath made nothing in vayne, but euery part to good purpose, and seruyng to some vse. Realdus I say therefore sound, that Appendances were in that order to the bones annexed, to the end that from the place of their coniunction, Ligamentes might be produced and made, to stryghten, hold, and stablish firmly, the composition and knittynge of the ioyntes: as you see the toppe of the thighe, with the bone of the hippe: and the neither part of it, with the bone of the legge. Likewise the bone of the shoulder, with the scaple bone: and that which in like sort is tyed to *Radius*, and *Ulna*. As for those bones that haue no Appendances, how they are united, I referre you to the History of Ligamentes to finde. And not onely where the ioyntes are, do these Ligamentes spring, but where no Coarticulatio is made also: as in *Ilium*, the Scaple bones, & some processes of the Vertebres. Whence also procede Ligamentes, necessarily chauncyng to the framing of the good constitution of Muscles, as in their proper place is to be sought. Whereby it commeth, that from thence very many Muscles haue their beginnings, whence also Ligamentall Cartilages procede: for so we thinke it good to call them, that to strengthne the Muscles, are amongst them disseminated: ending also at their Tendons. Now agayne it is manifest, that Galen (for all his industrious search) sayled to finde the truth, in affirmyng these Appendances to be added to the bones, for the conseruation of the mery, with in them included: but then sayth *Vesal*. How hapneth it, that other bones, in whiche are no cavitie so notably allotted to the receiuyng of mery, should (notwithstanding) also haue proper Appendances: euen as those, that are greatly hollowed. As for example the scaple bones, the Vertebres, & other small bones, which not being much medullous, are neuerthelesse not of Appendances destitute. But pretermittynge this conuia assertion of Galen, it is sufficient, that the truth is touched by the aforesayd reasons of Col. prouyng how Ligamentes by Appendances are most engendred, and consequently the two proper gifts giuen vnto Ligamentes. Which, whylest they are so necessary, as we haue proued, that the generation of Appendances be very vile, and profitable, who can inuent to deny: since their vses Sublated, but a few places can you finde, whence Ligamentes should fittly procede. And thus much you haue to vnderstand, as oft as you read of Appendances: in what bone or part so euer it be.

Αποφυσις which the Latin interpretours call *Processus*, is thus: whē a bone in any part, stretcheth forth his substance in excreasing manner, as a knot swelling

C.ij.

out

In young persons the Appendances are easily discerned, but not in old. A playne shew.

The substance of the Appendances is softer then of the Bones.

A prooff, for whē we cate meat, we will often plucke off the Appendances of Bones, & chewe them.

Why Appendances are not lost: of by continual motion of the ioyntes. Col. li. ca. 2.

The vse of Appendances for order: wherethen any bone Col. euer inuented.

How the Bones are united: and haue no Appendances.

Ligamentes not onely springing from places: nere the ioyntes, but also where is no ioynte.

Muscles often springing out of Ligamentall Cartilages.

The Ligamentall Cartilages do as last end in tendons among the Muscles.

Col. vi. part li. 9.

Col. supposed the Appendances seruē to hold in the mery.

A playne constitution.

Ligamentes from the binding together of bones, and to the constitution of tendons. There are but few places beside the Appendances, fitt for the production of Ligamentes.

What a proesse, called of the *Greekes* *Αποφυσις*, is.

The first Booke of the

The first difference
betwene the pro-
cesse and appen-
dance.

The second differ-
ence.
Some appendices
haue processe.

The third differ-
ence.
Some processe
may haue appen-
dances.

The processe
Trochanteres doe
seme appendices.

Colloc. cit.

The fourth differ-
ence.

It is scarce possi-
ble to find a bone,
whereon appea-
reth no processe.
What bones waite
appendices.

How the proces-
ses differ among
them selues.

The processe cal-
led Stylodes.

The processe cal-
led Corona.

The processe cal-
led Anchiroides.

A processe with a
depressed.

Processe long and
prominent.

A processe with a
round head.

What is meant by
a necke in the
description of
Bones.

Why in processe
a head is made.

Concauities are
euer answerable
to the heades of
the processe.

What is the Ace-
table.

What Glene is in
the cauities of
Bones.

Some cauities
in Bones are en-
larged by a pro-
cesse & cartilage.

out from the stocks of a tree, or as some Gibbous Tumor exceeding the height of the naturall places here vnto it: so such places of bones, as are apparantly to be discerned to exceede other partes, are rightly called Processe, sufficiently differ-
ring from the Appendances: for these are right parcels, and true partes of the
bones them selues, whereto they are fastened. Also Appendances them selues
haue Processe. As the bone of the cubite called *Vlna*, and the inferior part of *Ti-
bia*: as also other bones diuers: as will appeare to you plenteously hereafter. A-
gaine, to some processe Appendances cleaue, for the inferior processe of the *Scap-
ple* bone that is like the fashion of an anker, and the ridge of the *Scaple* bone
which in like manner is a processe therof, haue Appendances: but note that the
processe of the thighe called *Trochanteres*, or *Rotatores*, are more iustly to be ter-
med Appendances, then thynges with Appendances munit. For all that part
that swelleth forth (whiche therfore they call Processe) holdeth the place of an
Appendance, so that the Processe and Appendance there, is all one thyng. Yet
Vesalius made a difference betwene them: but when as by takyng away the Ap-
pendances, the Processe also are gone, we must Iudge (saith *Columbus*) them in
that place all one: and the Processe, & the Appendance, the same thyng, one that
the other is. Furthermoze the Processe and Appendance differ thus: For it is a
very small bone, out of which appeareth no Processe, neither may it be possible
almost, to finde such one, as exceedeth in no place: but there are many bones de-
stitute of Appendances, as those of the head, of the vpper iawe, of the lower, and
such other. Neither do the Processe not differ in them selues, chusing ech one a
sundry shape: for some of them are small, and like the fashion of a sharpe bodkin:
wherfore the Grecians call such Processe, *Stylodes*. Others also beyng sharpe
but not so slender, as the knagge of a hartes horne, that is to say thicke and poin-
tyng, such as are to be found in the neither iawe: *Galena* calleth such *Corona Pro-
cessus*. But besides, there are some that represent the similitude of an anker, as
the inferior Processe of the shoulder blades, called *Anchiroides*. Others end, or
leau at a head, and that two maner of wayes: for some haue that head depressed,
as the bones of the middle of the hand, where they ioyne to the lower, and of the
insteppe, meting with the Bones of *Tarsus*, and *Fibula*, & the neither part of *tibia*:
certaine Processe haue their heades longe, and prominent, as the vpper head of
the thighe, where it is knit with the Bone of the hippe: Others hauing round
heades, as of the shoulder, and shoulder blade, likewise the bones in the middle
of the hand, ioyning to the first ioyntes of the fingers: And of such Processe as
haue long heades, we call the slender part therof, from the body of the bone, vnto
the head of the Processe, a necke: forasmuch as that space is like vnto the necke:
as it shalbe playne vnto you, in beholding the necke and head of the vpper part
of the thighe, where it maketh entrance into the hippe. For this cause therfore
are the heades, of the Processe made, that by touchyng with in the cauities of
other bones adiacent, they may the better Coarticulate and ioyne together. It
is to be noted here, that as the fashion of the heades of the Processe, are diuersi-
fied accordyng to the places, so the hollowes that receiue them, must of necessitie
also be diuers and different, euer answerable to their proportiōs. A deepe hole,
or cauitie therfore, you shall call after the Latins *Acetabulum*, after the Grekes
κοτύλη or *κοτύληδωγα*, our English phrase offreth no proper terme for it, vnlesse
we shall call it a caue, case, or cuppe, in respect of that, which into the hollowes
therof it admitteth. But the playne and obscure, is called *γλήνη*, whose cauitie is
so shallow, as at first sight can scantly be discerned. Notwithstanding there are
certaine Circular Processe, which augmet the profundities of such Celes as are
largely excaued, which beyng placed in the vpper part of them, are called *Labra*,
or *Supercilia*, as it were the lippes, or browes, or as we may terme them the
brynkies

brinkes to those canes. These concavities are also increased by the Gristles in some of them growing, as appeareth in the cane of the Scaple bone, where it agreeth with the shoulder, and in the Articulation of the hippe with the thighe: and those Processes and Cartilages are they, whiche make the moze difficultie in Luxation. Further not onely in figure, but also in number these Processes are diuers, and disagreying, some Bones beyng endewd with very fewe, and others agayne with many: as shall better appeare in their particular descriptions. But now since Nature (as we haue sayd) made nothing in vayne, but all to good purpose, and (as we may say) needfully forecatted, let vs see to what end and purpose, were these Processes ordeined. You shall note therfore, that not for the commodious Articulation of Bones onely, but because from them also, as the springs from mountaines, so the Muscles are either from them produced, or to them implanted: hauing the offices also of Propugnacles, or resistant defences. Such as are of the shoulder blades, and the Processes of the Vertebres. *Subiudis* or *basis* are certaine corners, after the order of a firmament, or ground, beyond the which, and naturall vse of the member, the bone may not be suffered to moue: as appereth by the Cavities of the arme, that is, the Anterior corner admitting the first Processe of the Cubitte, at what tyme it is extremely bowed: and the Posterior Processe of the Cubitte, that coucheth in the hinder corner, when Extension is made neither can any of the Processes passe further in their Celles, then the vtmost seat, to them by nature limited.

Thus (frendly Reader) thou shalt finde it expedient, before thou enter further among the description of Bones, exactly to learne, and to haue in mynde (as the Proverbe is) at fingers end, those fewe decyphered names, which the ancient Anathomistes haue giuen, according as it seemed best to their learned opinions: and that either for the forme, situation, or properties of the partes. Which although we haue so farre accomplished, yet stay a while: for before I enter fully and directly to speake of euery particular Bone in the body, you shall commit vnto your memory, a word or two of the maner how mans body is construed, and combined, as touching the frame and Coarticulation of bones: as also of the straunge, and diffused names, wherewith their kindes of knittynge, in eche respect are nominated.

First therfore we must consider, how vnprofitable vnto man it had bene, if the frame of his bones had bene continuall, whole, or Solide, so consequently his motion, no otherwise then a brassen or stony Image: Whereas now to an infinite number of Artes, that need innumerable actions, man, by natures prouident worke in the construction of his frame, obtaineth accordingly, the passing perfection of mouyng, fitte for euery one. Then so it were requisite, that the composition of the bones should neither be dissolute, and vniopned nor yet altogether whole, and continuall: but so made, that by the fitte Coarticulation, and knitting together by proper ioynts, they might aswell bowe, and extend, as also remaine one depending on an other, and together supportyng. And notwithstanding the needfulnes of such Insoliditie, it is otherwise as requisite, that the Bones were not continuall, but rather by proper meanes vnited, and that is for Transpiration sake: as in vniyng the Bones of the head by Sutures: and agayne for the diuersitie of the partes, as where the moze hard, are committed to the moze soft.

Withens then Nature (as we say) in construing, and compoundyng the bones of mans body, hath not done it after one absolute reason, or maner, which euery man might easily comprehend, but so diuersly, as seemeth sufficient, tedious for the wisest: I will let you heare the opinions of the best learned, and famous Anathomistes, with the meanyng of the straunge names, wherewith they haue entituled the diuers compositions.

What maketh the Luxatio of the thighe moze difficulte. Processes differ in number also.

The first beilie of the processes. The second beilie

The third beilie

Gall. 1. vi. part.

What is to be understood of Basis in the description of Bones.

If these thynges be not learned, the history of bones is obscure.

The reader must be perfect in the construction, & diuision of bones, in their termes, before hee wade further in this history. Coll. 1. ca. 3. Why mans body was not made of one bone, solid, & continuall.

The suture of the head are made for the cause of transpiration.

The first Booke of the

What is a ioynt.
What Hip bones
made by the name
of a ioynte.
Lib. de art. & fract.
Col. ca. 4 li. 1.

Examples of ma-
nifest mouyng.

Examples of ob-
scure mouyng.

What is Diar-
throis.
What is Synar-
throis.

Enarthrosis is not
the same vnder
Diarthrois, as vnder
Synarthrosis.

Examples of E-
narthrosis vnder
Diarthrois.
These haue most
manifest motion.

Examples of E-
narthrosis vnder
Synarthrosis.

These haue ob-
scure motion.

What is Arthro-
dia.

In Arthrodia one
mouyng differeth
from another, ac-
cording to the
more or lesse ob-
scure.

Examples of Ar-
throdia vnder Dy-
arthrosis.

Note.
The ribbes doe
enlarge, and also
draw together.

Examples of Ar-
throdia vnder Syn-
arthrosis.

What mouyng is
proper to the
bones of Polibra-
chialis.

First therfore vnderstand that a ioynte called of the Grekes *ἄρθρον* is a com-
position of bones that is so ordained for some kinde of motiō. *Hippocrates* esteemed
simply the round part of that bone, that entred into y^e hollow of another, to be *Articu-
culum*, & so called it. Neuertheles we giue that name, to euery naturall cōposition
of bones, that is made for motion sake: whether y^e same be euident, as possesseth y^e
bone of the thighe, Articulated to the hippe, and the head aboue the necke, whose
mouyng therfore is manifest: or els obscure, as haue the bones of y^e middle of the
hād, to set the bones of the wrist, and the bone of the heele, to that vnder the ancle
called *Talus*: with other bones also of the like sort, whose motions are obscure,
as shalbe more at large other where. In respect of two kyndes of motions, two
differences also of knittynge are appoynted: the one, which no man may deny
to be euident, called *Diarthrois*, and the other, whose motion is hard to be discer-
ned, named *Synarthrosis*. And both are publikly deuided agayne in tripple wise,
that is eche of them hauyng thre differences: and yet to both, but thre named:
onely differēt in their kyndes, as *Enarthrosis*, *Arthrodia*, and *Gynglyman*. Which
thre, serue aswell vnder *Diarthrois*, as *Synarthrosis*, recordeyng that the motion
of *Diarthrois* is manifest, but *Synarthrosis* obscure. And this is called *Enarthrosis*,
with a deepe and p̄soud caue, or case, which we haue called *Acetabulum*, recei-
uyng the long, and round head of the bone that it ioyneith with all: as in the hippe,
with the thighe, the shoulde with the Scaple bone, the middle of the hand, and
instep, with the first bones of the fingers & toes. &c. These examles do explicate
the maner of *Enarthrosis* Articulation, vnder the name of *Diarthrois*. So that in
these sortes, consist not onely manifest motion, but also all kynde of motions, and
turnings: as Extension, Contraction, Circumaction, & such diuers sortes as we
will separatly shew hereafter. But that you may with more facilitie, gather the
sense hereof, that is to say, what *Enarthrosis* vnder *Diarthrois* differeth frō *Enar-
throis* vnder *Synarthrosis*, for familiar exāple sake, I referre you to the beholding
of the Articulation of *Talus*, with the botelike bone, and the 7. of the wrist, with
the first and second bone of the same: which Articulation also we call *Enarthrosis*,
yet not vnder the kynde of *Diarthrois*, but *Synarthrosis*: for as much as the mo-
uyng of these bones is most obscure, and hard to be iudged, without diligent heed
and markyng.

Arthrodia is a coniunctiō of bones, wherof the one hath a head dep̄ressed, the
other a shallow or playne cauitie, called Glene as befoze sayd, aunsweryng the
the head of the other so connectiue, as it is hard to know the head, from the
hollow: contrary then in *Enarthrosis*: wherby it cometh to passe, that the mo-
uyng is not so euident in *Arthrodia*, as in *Enarthrosis*. Notwithstanding in the
same *Arthrodia* is one mouyng more euident then an other, although euery kynde
of mouyng therof, is scarce euident: yet that, that is lesse euident, is to be altogether
obscure, in cōparison of the more euident. Therfore the more manifest motiō in
Arthrodia, shalbe attributed for a kynde of *Diarthrois*, & the obscure action, to *Syn-
arthrosis*. Exāple of the mouyng of *Arthrodia*, vnder y^e kynde *Diarthrois*: (which
as you heare hath the more manifest motion) you may take by the coniunction
of the ribbes, with the Vertebres, & their Processes. Who are both cōstringed, &
also dilated: as to euery sensible man, appeareth in breathyng. But *Arthrodia*
you shall note somewhat more manifest, in the Articulation of y^e first Vertebre wth
the scōd, & y^e bone *Radius* with *Ulna*. Cōtrary exāples of a more obscure *Arthro-
dia*, are y^e bones of the middle of y^e hād, with those of y^e wrist: In which also some
mouyng, after a certaine maner is to be discryed. As if in boluyng, you wishe to
bryng the little finger & thombe together, you shal well discerne the bones in the
middle of the hād, (which otherwise the hād being stretched forth, & straight extē-
ded did shew a straight figure) to be Circumduced, and obliquely moued. Which

is the motion proper to those bones: Such moze aptly is the obscure *Arthrodia* expressed, by the three bones of *Tarsus*, ioynd with the shiplike bone, & the bone *Cyboides*, with the heele: and also others others, who although they retaine some kynde of mouyng, yet very difficult to be perceiued.

The thyrde kynde of Articulation hath to name *Gynglymos*, and that is a mutuall Congresse, or Coarticulation of the bones, whe as in either of the endes that mete, perminent partes appeare, as also cauities or little hollowes: the whiche cauities of the one, admitteth the Processe of the other: and the Processe of the same bone, coucheth within the cauities of the other: so either of them into other making mutuall entrance. This Articulation also hath motions, both obscure, & manifest, the one to *Diarthrosis*, the other to *Synarthrosis* referred. That which is manifest, is to be looked for at the bone of the thighe, metyng with the legge, the cubit with the arme, and others. For the obscure kynde, regard the knittynge of the bone *Talus* with the heele, and of the bones of the wrist. All which thynges (good Reader) if you diligently note, you shall easily cary in mynde their manner of knittynge, with the partes of ioyntes, and differences of Articulations.

And this doctrine of the ioyntes, and composition of bones, I doubt not (after you haue once entred into the midst thereof) but you wilbe moued to thirst, in desire of often readdyng the same, and neuer cease till such tyme, as you haue made it as perfect as the Pater noster: so may you, with moze expedient celeritie read ouer, the particuler description of bones. Neither ca I iudge it tedious, or superfluous to any, saue such lewde practisers, as I haue spoken of befoze in my Preface: who I would not (by my will) should euer lose their labour to looke on it, without grace of repentaunce grow on them.

To go forward now therfoze, in this our iourney or pilgrimage, it followeth to speake of that kynde of coniunction of bones, that is called *Symphysis*: as whe they are so vnited together that they haue motion neither manifest, nor obscure. Of these are three differences, thus called by proper names: *Sutura*, *Gomphosis*, & *Harmonia*. In which no man, at any tyme, can discerne any motion. Although some heretofore, haue not bene ashamed to affirme, the bones of the head, which are ioynd by *Sutura*, to moue by proper motion: whose iudgements sure, are not vnworthely derided, since they will needes affirme that, which Nature neuer decreed. But peradventure they might thus deeuie themselves, by thinking the bones of the fore part of the head to moue, as oft as the same Musculous flesh there growyng is drawne together, upward, or downward: & so after the same sort, the bones of the nose, which are ioynd by the kinde of knittynge called *Harmonia*: when it is nothyng els, but the Contraction, or Dilatation of the nostrils, and such other partes of the nose. Let it be likewise as incredible vnto you, that the seames of the head can at any tyme lose, to giue scope vnto the motions of the bones: whiche are otherwise so fixedly compact together, as without the great stroke and force of a chissell they cannot be deuied. Such unlike then, to be readilye losed for every motion. And this proued, if is playne, that none of the differences of *Symphysis*, are endued with any kynde of motion.

But now let vs come to euery kynde by him selfe. First *Sutura*, whiche the Grecians call *sepi*, is a coniunction of the bones; in such sorte, as theweth like vnto the shape of a seame, or a mutuall Congresse of two bones, twedged like vnto a sawe: which layd together, the teeth of eche, one, entred the spaces of the other: whereby they are mutually composed and one with in the substance of another. Some adde an exaple of the Commissures like the nayles, not for that they mutually respect one another, but do occupy and stoppe the vacant places residet betwene the nayles of the fingers. Yet they seeme to approach nerer, to the nature of the thyng, which prefer the similitude of sawes, befoze the likenes of nayles:

What is Gynglymos.

Exaples of Gynglymos vnder Diarthrosis.

Exaples of Gynglymos vnder Synarthrosis.

That is no meat for Caterpillers.

What Symphysis is.

The differences of symphysis.

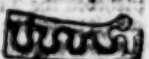
A ridiculous exaple for ridiculous iudgements. Colum. li. cap. 4.

Who will say the bones of the nose do moue after the motions of the nostrils, or wings of the nose?

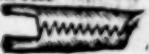
The seames of the skull are hardly with a chissell deuied.

None of Symphysis differencs haue any motion.

What is Sutura. The Commissures like the nayles.



The manner of closing, assimilated to the teeth of two sawes put together, as most in use.



The first Booke of the

Three seames in the head, in very aged persons scarce appa-
rant.

The seame called Stephaneia in the fore parte of the head.

The seame called Lambdoides in the hinder part of the head.

The seame called Obeliana, or Sagittalis, along the toppe of the head. When the scalle bones of the temples are united by a Suture, the same Suture is not deepe.

Those scalle bones are for the most part rather united by Harmonia than Sutura.

What is Harmonia.

Old writers haue comprehended Harmonia under the name of Sutura.

Broken bones do knit agayne in fourme, that participateth both with Harmonia & Sutura.

Examples of Harmonia.

What is Gomphosis.

Examples of Gomphosis.

Examples of Gomphosis.

Examples of Gomphosis.

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Examples of Gomphosis.

since those are rare to be found, these very often: Of which sorte, be three in the head. And these seames, which in old men are hard to be found, (For scarce their traces may be imitated, but rather do go together after the order of appendages:) in younger persons notwithstanding are very conspicuous, and playne to be sene. Wherof one of the is in the fore part, called *επαρεία*, an other in the hinder part, named *λαμβδοειδης*, the third is straight in the midst of the top, in like sort (of the Grecians) called *εβελιδια*, as we should say, *Sagittalis*, wherof in the proper place hereafter we will speake at large. And besides these, we must needs confesse unto Sutures to be in the head, if so be; you will account the scalle Bones of the temples, to be fastened by seames: which to be found very like in some scalpes, I deny not in deed: that is to say, to the like a sawe: as we sayd euen now: yet for all that, it is but so in few, & those also lyeng aloft of the other: wherfore doubtlesse the true vniu of such Bones, is rather to be attributed to that kynde of Symphysis called *Harmonia*, then *Sutura*. For by *Harmonia* is vnderstanded, that kynde of structure in the Bones, made by a simple meeting, that is to say, where neither swellings out, nor any cavitie, neither roughnes at all sometyne is found. Diuers auncient writers, haue comprehended this kynde *Harmonia*, often vnder the name of *Sutura*: as when broken Bones ioyne mutually agayne, by *Harmonia*, and *Sutura*: and neither way simply: but some where concurring euen, & in other places roned: being therfore a mixed vniu, participating aswel with *Harmonia*, as *Sutura*. Therfore not onely to beare the name of one of the. For a simple line, and Harmonicall meeting, haue the Bones of the nose, and such also is that, which constituteth the Palate: or to say more truly, deuideth it long wise in the midst. Of this sort likewise, are all the Commissures of the upper iaw, whose Bones haue onely lineall distinctions.

The third of *Symphysis* differences, is called *Gomphosis* (albeit that *Vesal*. denieth them otherwise) and this kynde of vniu is, when one bone, with in another is infixed: as a nayle into wood, or other thynge, which being pulled out, the place after is left vacant and empty: euen so, the teth haue in the iawes the proper selles, whence they may be drawn when occasion is offered. But besides the fastening, that they haue in the iawes, in dyed bodies: in creatures yet liuyng, they are also clothed aptly with flesh about their rootes, and contract, and filled on eche side with gowmes, which flesh is made so callous, and indurated, as that the teth thereby are not a little delited, and holstered: and the teth being drawn out, it closeth over the hole therof, so hardning, as that it is seruiceable in stead of the teth. But in dead bodies, where this flesh is dyed and consumed, or otherwise taken away, the teth may with small labour, be pulled forth. So that it is most certaine, all bones, by the benefite of one thing or other, to be coupled together, though among them selues, diuers. And besides all these kyndes of Articulations rehearsed, we haue yet agayne, to affirme the coniunction of Bones among them selues, to be by three kyndes of meanes. For either a Cartilage goeth betwene, and this union the Grecians call *Synchondrosis*: as els by the helpe of a Nerue or Ligament they are coniointed, and that they call *Synneurosis*: betwene the whiche, that is to say the Nerue, and Ligament, in deepe old writers could discern no difference: albeit we shall call it more rightly a Ligament, which the Grekes nominate *Syndesmos*: therfore this knittynge, after that rate, *Syndesmos*. Either els the union, is made, by the apposition of fleshe, therfore by the Greke name *Sysarosis*. But that kynde of copulation called *Synchondrosis*, is to be noted by the bones of the breast, and Pubis, the Vertebres themselves, and partes constitutyng the *Sacrum*, as also those with the *Sacrum* committed: so are Appendages iointed to their bones by a Cartilage. Examples of *Synneurosis*, are all those bones, in which are Ligamentes to be discerned, passing forth

from

from that part, whereas the Appendances are fastened to the bones: for with such Ligamentes those bones and ioyntes are clothed, and colligated. There are also certaine strong Ligamentes, springing after a certaine manner, in the middle of the heades, of some bones, whereby, they are together more strongly holden: as playnly appeareth in the Articulation of the thighe with the hippe, and againe betwene the legge and the thighe: neither other where to be found, but else with these, you number that Ligament, wherewith, the tooth of the second Vertebre of the necke, is knitte to the hinder part of the head. You shall not dread, to finde the examples of *Synsarcosis* very playne, in the fleshy firmness of the teeth in their Celles, by the gounes: which fleshy from them remoued, they become not onely presently lose, but also not long enjoying their places. These are the true diuisions of the composition of Bones, which since I haue with competent breuitie touched, I will not any longer stand in admiration of *Carolus Stephanus*, who either rightly knew them not, or els doubting, for feare of reprehension, gaue place vnto others: since that noble Galen (who verifieth this saying *Non omnia possumus omnes*) was not a little deceived, in ascribing to *Synarthrosis* these differences *Sutura*, *Gomphosis*, and *Harmonia*, with other like poyntes, wherewith at (notwithstanding) no man ought to grudge, if such a one as received the the whole Arte of Medicine, should in some poyntes, shew a little imbecillitie. But now to our purpose: it is tyme we approche to the singular description of Bones: which, this well noted that we haue hitherto sayd, you shall in reading, far more easilie vnderstand. But first, if in the reason and names of the composition of bones, hitherto so copiously handled, you be not sufficiently instructed, or fully satisfied, it shall not be amisse, that now and then, you helpe your selfe with this Table following.

Examples of the Ligament springing out of the head of a bone.

The example of Synsarcosis.

Carolus Stephanus hath erred in the composition of Bones.

What man is so wise as that in any thing bee shewd no imbecillitie.

D.L.

The



The first Booke of the

The Bones of mans body are compounded together.

By *Ioynts*, which is a composition of Bones with moving, wherof be two differences:

By *Symphysis*, which is a joining together of the bones without moving, and is divided in three:

Videl.

Diarthrosis,

Which is a knitting together of bones to some manifest moving, and is divided into

Enarthrosis,

Arthrodia,

Ginglymos.

Enarthrosis is, where a rounde or long head is inserted within some cavitie answerable to it: as is the Articulation of the thighe, with the hip. & shoulder with *Sapula*. & the first ioyntes of the fingers, with the bones of the backe of the hand.

Arthrodia is, where a place beyng lightly hollow, & that in the enter part, admitteth a litle expressed head, as the first Vertebre with the second, & *radius cum cubito*.

Ginglymos is that, where in the Bones doe enter mutually one into another, that is, both receive, and are received: as the cubite with the shoulder bone, & thighe with the legge, and the second and third ioyntes of the fingers.

Synarthrosis,

Which is a Coarticulatio without obscure moving, being divided into the same Species, or parts, as *Diarthrosis* is. *Videl.*

Enarthrosis,

Arthrodia,

Ginglymos.

In that onely they differ among them selves, these having but obscure, those manifest motion.

Neither is it any marvaile, that the same things, being diversly considered, may under divers kynds in the same Predicament be placed, for it falleth out sometyme in divers Predicamentes.

Cramples in this kynde are these. of:

Enarthrosis, the Bone *Talus* with the botelike bone, and the third Bone of the wrist, with the first, and second of the same.

Of *Arthrodia*, the Bones of *Tarsus* among them selves, *Cyboides* with the heele bone, and certaine Bones of the wrist among them selves.

Of *Ginglymos*, *Talus* with the heele Bone, & some likewise of the wrist Bones among them selves.

Sutura,

Gomphosis,

Harmonia,

Sutura is that manner of composition, sene in the head, wherein the bones are committed together & lyke the teeth of a sawe, as is

Sutura { *Coronalis*,
Sagittalis,
Labioides.

Gomphosis, is, where one bone lyke a nayle is fastened within another, as the teeth in the iawes.

Harmonia, is a joining together of bones by some simple line, as the Commissures of the upper iaw, & that chiefly, which is in the nose, and runneth after the longitude of the palate.

All these are committed together by

Synchondrosis,

Which is an union of the bones made by a Cartilage: as is sene in *Os Pubis*, the breast bone, and *Ilium*, where it is knit to *Sacrum*.

Synsarcosis,

Which is a continuation of bones by the apposition of the flesh coming upon them, as is sene between the teeth & iawes, as also in those ioints, which Muscles do environ.

Syndesmosis,

Which is a composition of Bones by the means of a Ligament, as in the ioynts appeareth.

Now

Now saying that the head of all the other partes of y^e body is most noble, containing in his cavitie y^e brayne, which (cleane contrary to *Aristotles* mynde) we proue the principall member of all others: we wil first begyn with the Bones therof: which to the brayne, in their construction, are so safe a muniment, as it is small thanks to say nature was most carefull in constitutyng of it. And in this poynt by the motion of *Galen*, we are constrained to put forth a question: that is, whether the head was made for cause of y^e eyes, or els of the brayne. To this the sayd *Galen* answereth in his viij. booke *De usu partium*, that the head for the eyes sake was so aptly ordained: to which opinion he was slenderly styrr'd, by beholding the eyes of certayne creatures, called Beetles, Cankers, & such other, which hauyng no heades, to the end their eyes might possesse y^e highest rowme, for furthest p^{ro}spect sake, nature hath limited them certayne Processe, to vsurpe the offices of an head. But, by the leaue of so famous a Philosopher, you shall heare the opinion of a latter practitioner *Realdus Collumbus*: who denyeth not *Galens* opinion in this respect, that for great consideration, and requisite causes, the eyes must wo^rthely in the highest place be constitute, and therfore the head to be a most necessary seate vnto them, in whose propper angles they are peaceably retained, and strongly munited from all externe and accidentall iniuries: but therfore, and for such onely vles, he graunteth not the head to haue bene made of such quantitie, neither of that figure, nor such a construction of Bones, but rather for cause of the brayne. For if y^e eyes should be the cause, (sayth he) could not nature haue deuised the head into two prominent Processe, in which the eyes might be placed to discerne a farre of? Yes truly, and to haue made them after a harder kynde of constitution: as appeareth both in those creatures that *Galen* nameth, as also in many other: the eyes of which creatures, if the creato^r had decreed to be of the like soft substance that the eyes of man are, then he would also haue prepared lyke muniments, and defences for them, to saue them after the same manner, from outward inconueniences. And surely his reasons are pithie in this respect, to dissuade vs from *Galens* opinio: and rather to beleue, that the head was made, especially of that shape, and figure, for the cause of the brayne: so much the more safely to keepe and defend it, beyng the habitation of reason: which maketh man to be accompted the deuine creature: which is the mistresse of all vertues, & Quene of animall faculties: whereon that the senses, continually as ministers, and seruantes, attendantly should wayte, in the same head also they obtaine euerie one their seates, as is not improperly declared in their places.

As touchyng the naturall figure of the head, called of the Grecians κεφαλή, *Galen* sayth it should be round long wise, on eche side lightly compressed, so that the fore part and hinder part be eminent, or out stretchyng. For as *Cerebellum* (towards the hinder part) lyeth vnder the brayne, and the spinall marey thence stydeth from the head: so contrarily, Processe arise from the fore part to the eyes, & to the instrumentes of smelllyng. And therfore this he accompteth the naturall figure of the brayne, and so consequently of the head. All other sortes he iudgeth rather vnsimely, then naturall: of the chiefest, or most notable of them, he hath made a fourefold diuision. The first of which is quite contrary to that we haue nominated naturall, wanting both prominences of the head: that is the former & hinder out goyng: so that in dede is exquisitely round like a Sphere. Of like sort, as *Homer* reporteth one *Thersites* to haue had: which figure, as it is cleane contrary to the naturall fashion, so it is a token of vniaptines, and folly, hauyng thereby the function of all vertues hindered, notwithstanding, all (for the most part) endowed with a sharpe or acuminate figure of the head, the Grecians call ποσειδώνος & εὐκλειπιδόρου. So *Pericles*, who, his head (as *Quintilian* writeth) being more long, and acuminate, seemed not to speake, or in any thyng to entreat familiarly, but

D. y.

rather

why the Anathomist of the head becometh first. The brayne is y^e principall member of the body, contrary to *Aristotle*. A question, whether the head be for cause of the eyes or of the brayne. *Galens* opinio, the head to be made for the eyes.

Lib. 1. cap. 9. The impugnation of *Galens*.

Collumbus p^{ro}ueth rather the head to be made for cause of the brayne.

A sharpe reason, in that the eyes of Cankers are dead.

Why for cause of the brayne y^e head was created. Reason is the Quene of all vertues.

Cap. 1. de osib. lib. 9. VI. part. cap. 17. & 11. Artis Medicæ

The naturall figure of the head.

Lib. 9. de vi. part. cap. 17.

The first of the four figures of the head not naturall.

Iliad. 8. *Thersites*.

Lib. 1. cap. 17. *Pericles*.

The first Booke of the

rather to throning & thunder out his wordes. And this, little agreeable to the right measure of the head, the Atticall Poetes haue named *κυνοκεφαλος* & *σχινοκεφαλος*.

The second figure of the head not naturall, is that, that in the forehead hath no eminence, but onely in the hinder part.

The third, is iust contrary vnto this.

The fourth figure is this, when both the sides of the head are more prominent, then either the forehead, or hinder part. But this kynde is so rare, as that it is not onely accopted not naturall, but playne monstrous also, and agaynst nature. Wherefore Galen sayth, it is altogether to the life of man vnprofitable: and that such, beside their shape, haue nothing that is proper to men. To this witnesseth *Andreas Vesalius*, who in Venice, beheld a boye, that being mad, besides many other straunge deformities of diuers members, and partes, had also this figure of the head. Wherefore it seemeth, Galen rightly iudged of this fourth shape, and figure of the head, whence reason is farre absent, not seemyng to know such monstrous kyndes of shapes: but is delited best in the most naturall, and the further of from that, the more distant also from her perfection.

But to our purpose, and that whiche is more requisite. The Bones of the Head are neither altogether Solid, nor yet wholly fungie, rare, or like *¶* Dumish stone: for that were to light & frayle, subiect to manifold iniuries, and the other ouer heauy, and to much (more then nature would) oppresse. Neither would the substance of such, be any thing so transpirable as were in that case expedient. For the head is as a certaine coueryng, put aboue a vessell that boyleth vnderneath it: so the brayne within it, is enuironed close as a hotehouse. But so, as if it should not haue passage out, after a certaine transpiratiue manner (since to the brayne many vapors and excrementes are continually ascendent) no man could endure, without great discriasie of health, and incōmodious lyfe. Wherefore prouident nature willyng, that as the brayne had oft occasion, so it should neuer want, the meane of recrementall purgynge. And for that cause, was the head not made of one whole and continuall bone, but of diuers, for the procreation of Sutures, or Seames: which nature, for the behōse of the brayne, decred so cōmodious. And this reason cōpelleth vs to subscribe vnto. Though to the great reproch of *Cornelius Celsus*, who affirmeth, or rather dreameth that the head, altogether wanting Sutures, is most safe, & the fewer Sutures that it hath, the more cōmodious also to the health therof: for surely he hath nothing that maketh of his side, to induce this opinion, except he deceined himselfe by to much regardyng outward causes. But besides that, *Hipocrates Lib. de homine* hath testified agaynst *Celsus* in these wordes: *Saniores capitis sunt, qui plures Saturas habent*: and that Galen, in sundry places, commendeth the construction of the head made with Sutures. I thinke it good also to declare vnto you the Assertion of *Realdus Columbus*, in this respect, a man, in matters Anatomical, not meanly experienced. Who once, hauing brought vnto him a certaine young man, whom death, by continuall tormentes of the head, remediless, and in spite of Physickes ayde, had seased on: found by Dissection, that through out his head, scarce the tract of one Suture could be obserued, but rather, as the head had bene of one Solid, & entier Bone, so that in the end, by the due obseruation of the Dissected parts of that man, the whole multitude that were with him (as it were with him one mouth) gaue sentence, that his continuall cruciable payne, and capitall dolour, was engendred of no other cause, but the streite composition of the Bones of the head, through which no passage could be procured: whereby those grosse, and vaporous fumes (which otherwise by the seamy Commissures, would transpirately euaporate) being in such retentive sorte included and findyng no passage to regurgitate the superfluities, were not onely the originall causes of his perpetuall dolour, and

The second figure not naturall.
The third figure not naturall.
The fourth figure not naturall.
The fourth figure not naturall, is rare & monstrous.

Lib. 1. ca. 5.

Vesalius maketh mention of a boy that was mad, hauing this fourth figure of head. The further of from the naturall figure, the further also from the perfection of reason. What kynde of bones are to the head.
Why the Bones of the head were not fungie.
Why the bones of the head were not made altogether Solid.
The making of the head to a pot compared.

Wherefore head is distinguished with Sutures.

Lib. 8. ca. 1.

Lib. 1. ca. 5.
A story of a young man, who dyng through payne of his head, had no Sutures in the skull conspicuous.

and animall veration, but also in fine inferred death. And this not once, but often tymes he ratified by experience, both in men and women, as one, in this poynt, greatly desirous to be satisfied. Wherefore it is marueilous, that so great a man, and learned as *Celsus*, could so much as thinke that, which he hath in this poynt playnly published: whereas he onely respecting externe daungers, we can proue, that the inner ought moze to be feared: that is to say, the fuliginous recrements, inwardly ascendyng without any transpiratiue bent, to procure moze eminent, and irrecoverable perils, then outward percussions: except such, as (were the skull all one bone) would finish the lyfe. So that we must needs deny his whole reason: that is to say, both that the brayne is moze safe, by the inseparable coagmentation of the Bones, or healthfull, by their Soliditie. For therfore the head, beyng thus of bonye substance, whiche by the violence of some stroke might be fractured, or confused, it behoueth to be rather construed of diuers bones, to the end, that when one part, by some such outward iniury, is broken, the other parts (notwithstandyng) might wholly be reserued: since in the head one stroke, can not reach very far beyond the endes, or borders of the part percussed: which would otherwise (no doubt) fall forth, were the head of one sole bone constituted. As for familiar example, strike a vessell made of earth or stone, so that it be of comparable thickness, and you shall commonly see, that by breakyng one place, you shall commit the rest also to peeces. Wherefore not iniuriously, or baynly, is the healthfull head distinct with Sutures, or seames: for as them, to transmit the fumes, recrementes of the brayne, this is not the onely benefit: but their apt construction also is the cause, that outward percussions, making breach in one part, to do the like in another, are aptly prohibited, except the stroke (as I sayd) be exceeding greuous. But besides all this, I hope, when I haue reuealed vnto you a thyrd commoditie, appertaynyng to the Sutures, you will metely be satisfied, as well as I. For vnto them is Appendant the Membran of the brayne called *Crasa Membrana*, or *Dura mater*, which, as shalbe sayd hereafter moze largely, beyng effused by Fiberlike tyng through the same seames, doth engendze on the outside of the scalpe, an other Membran, which inuolutio is ordained, for the Extrinsecall Obduction of the capitall Bones: and this coueryng is called *Pericranium*. But some perhaps will here object, and say, that they haue found in aged persons, the skull destitute of Sutures, yet they liuyng, were not vexed with paynes of the head: I answer, that likewise in men or women, that haue liued many yeares, neither will the Appendances of their Bones be separated: though in persons sufficiently young, they be most manifest: but maruaile not at that, since extreme youth, or extreme age, in Anatomicall affaires are not to be obserued: or at lest to excite any controuersie in Arguments. For certayne partes of infantes, till after a competent space of tyme, are by the tendernesse likeliest to Cartilages: yet no man is so senselesse, to deny there beyng bones. But let vs draw nearer to the matter.

By appellation of this name Head, vnderstand you the vpper part and toppe of the body, created for the cause of the eyes, and brayne: whose proper figure should be round and long, after the similitude of a long Sphere; on both sides depressed, beyng by the name distinguished from either of the sides: that is, sometime called the Skull, some tyme the Scalpe, construed woorthely of diuers bones, and those, both within and without, hauyng a smoth crust, and hard face, but in the middlest Fungous, and like a Pumice stone. Further, these bones are perforated, here, and there, vnderly, with a sort of smal holes, to the end, that by them, the little Tendinges or Spraggie branches of veins, and Arteries, which byng blood for nourishment, and spirite for the increase of beate, and conservation of lyfe, might haue pleasant passage. And therefore be the bones of the head, betwene the outmost, and inner scales, cauerneous, or hollow: not onely thereby, to become

Columbus in this poynte satisfied him selfe both in men and women, findyng in them that were much giuen to paynes in the head, the Sutures to be growen by. Here Celsus dyd most respect outward daungers, when as in deede the inner are moze to be feared.

A notable reason agaynst Celsus, why the bone of head is deuided.

A familiar exaple

In briefe the reasons, why the head hath Sutures. The first reason. The second reason.

The thyrd reason.

Dura mater, goyng forth by 2 seames begeth Pericranium, to couer also the outside of the skull.

It is not the object of aged persons that can confute this reason. Extreme age or extreme youth is not to be obserued in the Anatomie.

As in children some partes of bones through softenes become Cartilages: so in some aged persons the Seames of the head are done away.

What significeth the head.

The vber of the head. The figure of the head.

Why the bones of the skull are pearled with many little holes. Why the middle part of the bones of the skull are fungous.

The first Booke of the

more light, but also to containe medullous substaunce for their food and nourishment. This Punicous substaunce, intersted betwene the sayd scales, or crustes, is the cause that some haue sayd, the skull to be condited and made of two walles, which they call Tables: meanyng those y. crustes, or scales, which beyng hard, and therewith a litle thicke, do shut in on eche side that sayd Spongious & medullous substaunce. These bones are seingated on eche side, in their endes and borders, obtaynyng in all such places, by generall appellation of the Anathomistes, Sutures, or Seames: of which, here is so much to be spoken, because they are expedient in the explication of the bones of the head.

Now therfore of seames, some be true, some false, which being rather in dede Commissures, are more to be referred to *Harmonia*, then *Sutura*. But to recount vnto you by one intier & direct number, how many Sutures there are in the head, *Realdus Collumbus* sayth vij. if all be accompted, wherof v. be false, and improper: and iij. proper, and true. Of the true, one is, that in the hinder part of the head, & in the foundation therof, where, it goeth on both sides towarde the eare, the goyng vp of which in the begynnyng, is broad, but higher and hygher ascending, becommeth narrower, like the fashon of this Greeke letter Λ , for which cause it hath lōg tyme, and still doth reteine the name accordyngly, that is, *Λαμβδωδης*: this denieth the Bones of the temples and Sinciput, from the bone of hinder part, or Occiput. An other, is in the foremost part of the head, compassing the forehead like a kynde of halfe circle, and is called by the name of the place *σφαιριαια*, in Latin *Coronalis*: this seperateth likewise the Bones of Sinciput, from *Os frontis*.

The thyrde Suture is that, that runeth straight on the top of the head, distinguishing the right, fro the left side of the head: & for asmuch as it lyeth straight lengthwise on the head, fro *Labdoides*, to *Coronalis*, it is nominated of γ *Grecias* *επιλαια*, the Latins *Sagittalis*, or *Recta Sutura*. And this Suture is sometyme, sene (though some Anathomistes haue seemed doubtfull to pronounce it) to augment his circuit, down to the neither part of the forehead, and toppe of the nose: which I am not onely moued to affirme by the probabilitie of some approued authoys, but dare safely also auouch it, by that experience my selfe hath tasted. But that princely Peripatetici Aristotle, was much deceiued, in making a difference betwixt the heades of men, and women: when as in dede that way, there is no kynde of difference, but rather mutually in the selues, diuersified. Therfore that rule is not to be obserued, though others since his tyme haue not slackt to say, that this *Sagittalis Sutura*, descendeth to the nose in women, but not in men: or contrariwise: for both is false, since in either it may be found. Although in dede (as it is) very rare, or seldome. No lesse is the opinion, of the same Philosopher dissuant from truth, in that he saith, that the head of a dogge is continuall and without Sutures, whereas diligence shall finde it most directly distinguished with Sutures: & those, more elegant then in men.

There are besides, two seames sited after the bended length of the head, equally distant from the Sagittall seame: these are caried about the eares, from the extremitie of the discedent *Coronalis*, with a certayne circular walke, and in some reache downe to the lowest seat of *Labdoides*, in others agayne, not passing *Maxillares*. These y. seames, that is to say, on both sides one, beyng as skalie bones, and conglutinate, or layd on like scales, are accordyngly called skalie bones: the thinner part of one, lyeng to the thicker part of an other: and so by due proportion, ioyned together: like as may be coniectured, by the sight of Fishes scales, or the yon plates of a iacke, one lyng on an other. And note, that of them, the outmost is much harder then the inner: because it lyeth aloft, and therfore nature ordained it as a defence for the other. These are the lineall coagmentations of the two

scales,

The two walles of the skull.
The tables of the bones of the head, whiche shut betwene them the spongious substaunce.

What are called the Sutures.
The knowledge of the Sutures is expedient in the explication of the bones of the head.
The diuision of the Sutures.

The true Sutures are Harmonia.

The number of the Sutures.
Loc. Citat.

The description of the Suture called Lambdoides.

The description and vse of the Coronall Suture.

The names, description, and vse of the Coronall Suture.

The Sagittall Suture sometyme cometh downe through the midst of *Os frontis*.

Fach. Lib. cap. 2.
That the descende of the Sagittall Suture maketh no difference betwene the scalpe of man or woman.

The descende of the Sagittall Suture is not common either in man or woman.

Col. libid.

That a dogges head is distinguished with Sutures, agaynst Aristotle.

The description of the Seames of the skaly bones of the temples.

The ioyning of the skaly bones by familiar examples.

That part which lyeth without is harder then that whiche lyeth under it.

skales, that keepe the compressed sides of the head, bordyng upon the other bones, or on their endes Superiacent: but because their knyttynge is not Suture like, that is, one mutually let into an other, like the teeth of two sawes ioyned together, and as the aboue mentioned are, they are called therfore of the Greekes *Απὸ τῶν προσκολλημάτων*. That is, skale Cōglutinations. Galen hath named them *χρονία*, or tempoꝝall Sutures. And for that these bones do represent scales, to the sides of other bones (to make by the inclosure) adherent, they haue no other nomination than, *Ossa squamosa*. These fine are proper to the head.

Then the vi, is that, which frō the extremitie of *Labdoides*, is deduced throught the middest of the stonie or hard Bones, stretchyng forthwith to the foundation of the head, where it meteth with the first Vertere, or turnyng ioynt: and this part, Galen calleth additions of *Sutura Labdoides*. From thence agayne begynnyng, vplwardes on both sides, it creepeth to the hollowes of the temples, euen to the endes of *Coronalis*: whence reflected downewardes, to the extreme teeth, and palate, it is common both to the head, and vpper iawe: and comprehendeth in it the whole bone called *Cuneale*.

The vii. denieth the bone of the head, that is named the viii. from *Os frontale*, seperatynge it wholly from all the partes thereof.

The viii. & last Suture begynneth at the hollowes of the temples, where the vi. is reflected, & begynneth to descend, & creepyng through the middle regio of the lesser corner of the eye, as also through the middest of the eyes roundell, thence tranuersly spedeth to the toppes of the nose, & so seuereth the vpper iawe from the forehead: but in the inside of the head, nere the foundation of seate, *Os cuneale* disioyneth it selfe frō *Os frontale*. And thus much you haue to consider of the Sutures, as touching that, that appertaineth to the outward vtiels of them. For within, at all appeareth the shew of no Sutures, but rather *Harmonia*.

Galen maketh relatiō, how in heades, varyng frō the naturall figure, diuersitie among the Sutures likewise shalbe found. Which *Realides Columbus* denieth, as also the not natural fashions of the head: although some be more, or lesse compressed, or backward, & forwarde prominent, yet (sayth he) all are of naturall forme and fashion, and the bones, with Sutures all, to be named: though somewhat, by the places and greatnes, discrepant. But whether it be so or no, or whether the diuerse figure of the head (not beyng monstrous) shew shorter, or longer Sutures, or more crooked, lower, or hygher, lofter, or more compact: it is but folle for vs to stand in doubt of, or dismay our selues, or to detract the tyme with longer discourse. For lightly, in any of them, you shall finde some mention made of the rehearsed sort. And we accompt it sufficient, that our description, be consentynge to the veritie of the thyng.

Part these viii. Sutures, remaineth the Bones, constituting the head, to be decided. Which Galen numbꝛeth somewhere sixe, other where vii. but *Desalins*, & *Columbus*, both with one consent (as it were one subscribyng to an other) haue inuented viii. thus accomptyng. Two of the fore part, called *Sinciput*, or *Bregma*: this *Bregma*, is to be vnderstode the vpper part of the head forehead, nigh to the Coronall Suture. It is the place, that in infanten, and late borne sucklynges, is so soft, and tender, that vnder it, both *Sissole*, and *Diastole* of the brayne, most euident, and with pleasaunt perspicuitie (so that no man needeth to doubt of the constriction and dilatation that the brayne obtēneth durynge lyfe) is to be discerned, notwithstanding that by litle, and litle, dayly more, and more, it becommeth in tract of tyme, sufficient hard, and bonny: yet woundes therein are noted deadly. And to certifie you of these Bones of *Bregma*, or *Sinciput* more playnly, those are they, which close their Suture betwene *Labdoides*, and *Coronalis*, cuttyng out the space betwene them: whose seame is called *Sagittalis*. Frō either side of the same

Fuch. Lib. x. cap. 8.
Where these are called tempoꝝall Sutures.
Why these bones are called Squamous or skale.

The descriptiō of the vi. Suture.
Additions of the Suture Labdoides.

Where the first Seame is comēd both to the head and vpper iawe.

The descriptiō of the vii. Suture.

The descriptiō of the viii. Suture.

The Sutures are without conspicuous, but within scarce appeare.

Lib. 9. vi. part. cap. 17.

Lib. de osib. cap. 2.

Lib. x. cap. 5.

The diuers figures of the head varyeth not the number of Sutures.

The differences of Sutures.

Lib. x. de osib. ca. 2.

Lib. x. de vi. part. Bones of the head.

r. Columbus ibidem vt sup.

2. In the part of the head called Bregma in childen, the constriction, and dilatation of the brayne called *Sissole*, & *Diastole*, is playnly perceiued.

Woundes in Bregma are deadly.

The upper seame of these bones of Sinciput, is the Sagittall Suture.

The first Booke of the

Sutura Sagittalis, where they mutually coagmentate, they descend equally to the uniting of the scallie Bones. Wherefore, considering their situation on eche side, you shal finde them fashioned after a quadrigular, or sower square maner, thus hemmed in on eche side: in their upper partes with the straight or Sagittall line: in the foreside with the Coronall: behynd with *Labdoides*, and beneath with the scallis conglutinations.

The description of these two Bones of Regma or Sutures.

The circumscription of Occiput.

Why a Prominence in Occiput is made.

By a Prominence understood, what portion soever both notably surmount the parts circumstant in thickness, like as a hille in the playne: and this I write the reader so easy in imbrace, for benefite of I will expound this word no more. The marvellous industrie of nature.

Why the bone of the hinder part of the head is thickest.

Tert. de Hist. anim. The opinion of Aristotle is related to who affirmeth the bone of Occiput to be thickest.

The weaker partes of this bone are strengthened by the Muscles of the necke. Col. Lib. 1. ca. 5.

Aristotle falsly imagined the hinder part of the head to be emptye.

Occiput consisteth of five sides, Galen sayth but three.

The description of the sides of Occiput.

Note. Occiput in children both consist some tyme of v. some tyme of viij. bone. The brittle of the deuided Occiput children.

Two Prominent partes in Occiput their fourme, and why they were so made.

The third bone is called *Occiput*, ending at the Labdall Suture: besides that in the foundation of the head, it is disioyned from *Os Sphenoides* by the first Suture, ouerthwartly chauncing. And this bone is made of vnequall partes: that is, in some places thicker, then agayne in others thinner, but in the midst of the seate or ground thickest of all. Neither not elegantly hath nature erected a Prominence, fro that hole, whereby the braine is deriued into the spinall marey, which bywardes ascendeth to the toppe of the same bone: thereby to make it more able, and strong. For so nature carefully impended her study, in the whole construction of mans body, her notable worke, that as the partes incident to small daunger, haue litle wherewith to defend them selues, so such as are sited in most eminent perilles, and as it were in the forefront of irrepugnable damages, those commonly are armed with double shielded defenses. As we see, a man, in falling forwardes, hath his hands to stay or beare him vp, but backwardes, goeth prone, without all hope of recoverable stay, till the hinder part of the head feele the waight of his body. Judge then (since this is most true, as what soeuer is truest) how farre good Aristotle was deceiued, that would needs, haue this bone of the hinder part of the head, to be, of all others, most weake, and thinne. But to come agayne to our matter. The other partes of this bone, beside that Prominent place spoken of, are but litle in deede, or of small rowme: but those also sufficiently thicke, and solid, neither voyde of flesh, but safely conered with Muscles, occupieng the hinder part of the necke: and on this bone resteth *Cerebellum*, neither otherwhere is emptye, though it pleased so great a Philosopher so to affirme. Besides this, to demonstrate precisely the circumscription of this same bone *Occiput*, it seemeth to be forged with five sides, notwithstanding the authoritie of such as write but thre. Among which, the two first begyn at the neither part of the Labdall Suture, nere to the bones of the temples, and so ascendyng with the same Seame of either side, narrower, & narrower, till it haue touched the point of *Labdoides*, where these two sides meete. Two other, fro the hiele of the same Suture, stretch forth after *Os mamillare*, and downwardes, till they come to the line or Suture that seuereth *Occiput* from *Sphenoides*: by benefite of which transuerse deduction of the same Suture, is necessarily made the v. side to *Occiput*. But this note, that as this bone in the hinder part of the head, in persons of strengthened yeares, is all one, and vndeuided: so in young childre, into foure or five partes, yea some tyme into viij. distinguished. Beyond all this, this bone hath in it, the most notable hole of all the bones of the head, made for the going forth of the spinall marey: In which hole, appeareth foure seperations, or diuisions, so that it seemeth to be deuided into foure partes: from among whose spaces floweth a Cartilage, which, after the maner of a Ligament, connecteth the head to the first and second Vertebre, whereby the same, beynge of so great quantitie and waight, might more firmly be bound and obligated, to those smal bones and turnyng ioyntes of the necke: of which Ligamentes, we haue entreated more aboundantly otherwhere. Finally, this is to be noted, from the sides of this hole procede two swellinges, or prominent portions, which are couered with a Cartilage, being vnto them as a crust: wherfore they are not sharpe, but made so for the purpose, to be let into the caviities of the first Vertebre, for the better constituting of the head his articulation.

The fourth bone is *Os frontis* which is simply and onely one (vnlesse it be other.

therwise in such Scalpes, as haue the Sagittall Suture discentyng down to the toppe of the nose, which (I say) is seldome found. Therfore, this we call p^r Circumscription of *Os frontis*, when it is found one and vndeuided. First, it is sepe- rate from the Bones of the foze part, o^r *Sinciput*, by the Coronall Suture: Next, from the Cuncall bone, by the vi. Suture: Thirdly, seuered by the vii. Suture, from the viii. bone of the head: Lastly from the Cuncall bone, as also frō the vpper iawe, by the intercision of that Seame, which rising from the hollowes of the temples, pearseth, through the middle seates of the eyes, euen to the toppe of the nose: where the eye bowes end. This bone of the fozehead is (after a certaine maner) round, and no where so thinne, as where it constituteth the vpper region of the holes of the eyes, and meteth with the viii. bone of the head. But this note that I will tell you, which Galen (as farre as I haue read) neuer made mention of. Aboue the toppe of the nose, where the same is committed to *Os frontis*, this bone of the fozehead holloweth it selfe, on ech side, both where it maketh the vpper region of the eyes, as also prominently constituteth the bowes, and setmeth, as if it were lined with a thinne scale: betwene which, and the outer Solid side of *Os frontis*, these caviities runne, after the maner of this figure) (, to the contri- nyng of ayre, as *Vesalius*, and *Collumbus* haue imagined. Wherby it appeareth, in this place, to be, by reason of such celles, most thicke: but yet in the space aboue, and betwene them, it is most Solid, thicke, & firme, as also more infirm^e, thinne, and weake, where it is committed to the Sagittall Suture, & vpper bones of the head: because there it is in infantes Mēbraneous, as before is spoken of that por- tion of *Sinciput*, that bordereth vpon the Coronall Suture.

After this, follow the bones of the temples, which, in their vpper part, that is towarde the Sagittall Suture, are equally circumscribed with scale Agglutina- tions. But behynd, with the partes o^r additions of the Suture *Labdoidis*, and with the vi. Seame, which seuereth their lower partes from *Sphenoidis*, and seuereth their Anterior part from the vpper iawe, and on *Os frontis* bordered. These bones (who soeuer sayth the contrary, as Galen that accompted them iii. square) are notwithstanding most properly to be termed Circular, o^r Round cōpassed, soz so they shew most in the Superior part. Onely their forme is obscured by many Processes. The first of which, are the Mamillar Processes, dependent like vnto the broken bowes of bankes, hanging downe, but beare their names soz representyng the fashion of Tetes in a Cowes bodder, called therfore of the Greci- ans *Μασκοειδης*: which processes serue not onely to the insertiō of Muscles, but that in them also might be contained most excellently, a large cavitie, to the Organ of hearyng exceeding necessary. Wherfore you shall ever finde it boyde and empty, runnyng in with diuers caues, and priuy corners. For eouer not farre frō this, bursteth forth, from the foundations of these two bones, two other processes nota- ble, which are not onely very small, but also long, and hard, endewed with ma- ny names, soz the diuers kyndes of shapes, whereto they are likened. As *Βελονοειδης* after the Image of a needle: others, soz the similitude of a wrytyng Tables pēne, haue named it *γραφοειδης*, o^r *τυλοειδης*. o^r, soz the likenes of a Cocks spur (whiche in my opinion is of all rest nearest vnto the marke) *αλκτρον*, although *Styloides* most of all is vsed. And these stilisozme, o^r spurrelike processes are pro- minent next vnder *Mammillares*, stretchyng obliquely sozwardes, & poyntyng as it were to p^r Anterior reflectiō of the neither iawe, where it is called the Chinne. The thyrd Prozesse of the temporall bone maketh a portion of *Os iugale*, wry- dyng out crookedly, frō the neither part of *Temporale*, where it maketh somewhat a slender reflection, the more aptly to mete with the iugall bone. And more then these *Vesalius* neuer remembred. But *Realdus Collumbus*, a famous man to be re- membred, who, in these matters Anathomicall by his exploziatiue indagation,

C. j.

setmeth

Os frontis is a simple bone. When *Os frontis* is two. The circumscrip- tion of *Os frontis*.

Where *Os frontis* is most thinne.

A large cavitie about the eye bowes in *Os frō-* is whiche Galen knew not.

The ble of that cavitie in *Os fron-* tis.

Cap. 6. Cap. 5.

Why the bone of the fozehead is towards the Sa- gittall Suture thinner.

The bones of the temples.

5. 6.

The figure of the temporall bones.

The figure of the temporall bones.

The Etymologie of the Mamillar Prozesse.

The bones of the Mamillar Prozesse. The Mamillar Prozesse is bot- low, and why. The Prozesse cal- led *Styloides*.

This Prozesse hath diuers names, as *Βελονοειδης*, *Γραφοειδης*, *Styloides* and *Plectron*.

The manner of the spurlike Prozesse. The descripiō of the thyrd *Pro-* cesse of the tem- porall bone. Loco Citato. He commenteth the industrie of *Realdus Collumbus*

The first Booke of the

The fourth Pro-
cess of the tempo-
rall bone.

A more plain ex-
plication of the
third processe.

The cavitie wher-
to the neither iawe
is Articulate.

Why the Greekes
call these Bones
Lithoide.

The prouidence of
nature in crea-
ting the tempo-
rall Bones.

The seventh bone
of the head called
the Cuneall bone.
What is called
Basilare.

The description of
this Cuneall bone
of Sphenoides.

The bone of the
of Sphenoides.

A new opinion of
the Animall Spi-
rites.

Cap. supra.
The Cell in
Sphenoides.
The Glandule re-
ceiuing the Seme.

The Processe of
the Cuneall bone
called Pterygoide.
Whence spring
the Muscles that
shut the mouth.

The delineation
of the viij. bone
of the head.

seemeth to haue sifted a mite, and clouen a beare, hath not so let slippe, or wine-
ked at the fourth processe, which beginning nere vnto the roote of the stiliformed,
swelleth out long into the inner part of the head, in the which is made that noble
Labinthe, resonant to the reflecting ayze of euery noyse: which we will here-
after, with more requisite prolixitie, decyphre. But to make the third processe re-
cited, better knowne, and more manifest to your intellection, you shall note, that
when it riseth from the *Anterior* part of the Organ of hearing, it stretcheth not
directly along by the sides of the temporall bone, but crouketh vp, toward the in-
gall bone, in Circular sorte, not vnlike the arche of a Bridge, vnder which, sub-
enteth, the hollow of the temples, and to the beginning of which processe, is
the bone of the neither iawe Coarticulated. For vnder the rising of the processe,
nere to the auditoie passage, is a cavitie, deeply incased with a Cartilage, wher-
unto is inserted, the longer processe of the neither iawe: And thus much of the pro-
cesses, from the temporall bones, prominent. Which bones are, (towards their
foundatio, and lower partes) anfractuouse, rough, and stony like, compared ther-
foze to rough and stony, bankes, wherby they obtaine of the Greekes this name
Lithoide, for the same cause. Contrariwise, aboue, and in their vpper partes, light,
and most thinne, especially in such places as the temporall Muscles are spread:
but, together with their thimmes, nature hath graunted them to be sufficiēt hard,
so that (without great perill of lyfe) they may not be broken.

The vij. bone of the head sheweth diuers fourmes and fashions, wherfoze the
Grecians thought good to call it *πολύμορφον*, as also *σφυνοειδής*, that is to say, *Os Cu-
neiforme*, or *Cuneale*: since that betwene the bones of the head, and vpper iawe,
it is intruded like a wedge. The barbarous sort call it *Basilare*, because it substra-
teth the brayne, no otherwise then a ground or foundation thereto. For in the
middest of the foundation or ground of the brayne, it sitteth, compassed about
with the vij. Suture, which comprehendeth in it this whole bone: beside the fore
part, where it endeth at the vij. Seame. But in the same seate it is thicke, con-
teinyng within it a hollow caue, which is all one with the cavitie of *Os frontis*, in
which we haue sayd the ayze brayne by the nostrils, to be retayned, vntil it syde
from thence into this hollow place: the mater of which, helpeth the brayne in for-
gyng animall spirites, if *Collumbus* his opinion newly inuēted, in that respect, be
any thing credible, as will more at large hereafter, when we come to the animall
Hystory, appeare. This denne or hollow caue is large, and commonly vacant in
all persons, though in some (perhappes) you shall see it replete with a certaine
Spongie kynde of substance. The couer therof is a hard and thicke scale, which
Galen likeneth to a searse, as though it were full of holes, to strayne the moyst
matter of the brayne: which *Collumbus* utterly denyeth. But this note, that he
sayth, in the middest of the inner part of the skull this bone hath a certaine prop-
per Cell or corner, in which for the purpose, is a Glandule aptly sited to receiue
the same humiditie, which thence afterward, maketh recourse vnto the Palate
and nostrils, the wayes of which one, haue sufficiēt scope into the other, as shal-
be sayd. For euer the sides of this bone, where it beholdeth the hollowes of the
temples, haue two partes, inwardly hollow, but outwardly conuered, or imbos-
sed. Finally in the outward part of this bone at the foundation of the skull where
the teeth called Grinders are fastened, are foure Processe, that is to say, on eche
side two, spreading like vnto the winges of Battes, called therfoze by the Gre-
kish name, *πτερυγοειδής*. In the middest of these processe is a deepe cavitie wher-
arise the Muscles that serue to shut the mouth.

The eight bone of the head is placed about the middle of the foundation of *Os
frontis*, seiungated from the Cuneale bone, in the inner seat of the skull, by the vij.
Suture: but outwardly endyng at the second and third bone of the vpper iawe.
the

And besides the hedge of diuision of the nostrils that it maketh, it stretcheth no lesse, to the constitution of the seate of the smellyng Organs: for the which cause of smellyng, it is diuersly distinct with many little holes, and of his owne substance thinn. Wherefore it is called *σφαιροειδης* for the likeness of the thynge, beyng a Searle that it aptly representeth: by vertue of the which, since we naturally receiue the Facultie of smelling, we must gather thus the ground of our argumēt, that a man loseth the same, or at least hath it dully, labouring in continuall destillations of the head, and Coriza. For thereby these holes are stopped, and the spirites deteyned, so that the sauour of nothyng can be conueyed in, or at leastwise, sensibly discerned and iudged. Galen sayth these holes are liker the celles of a sponge, because they are crooked: affirmyng that *Dura Membrana* is also accordyngly perforated. Neither (sayth he) is it onely a seruauit for the receipt of sauiours, but also an officer, to vnbourden the brayne of Flegmaticke excrements. Which, neither could be auoyded through those holes, neither any vapo: of smel ascend, vnlesse nature did puruey the same, both by inspiration, and expiration. For by the syding in and receipt of inspiration, is moued the dignitiō of sauiours, and agayne by the force of expiration, excretion of superfluities is made: the vehemencie of the spirites halyng out with them the noysome excremēt. In the middle region of this bone, goeth out a highe and thinn Procelle, seuering that passage into two partes or sides, where the instrumentes of smellyng are situated: which also into the nostrils descendyng, constituteth the hedge, or partition of the nose.

After this maner be the bones of the head naturally, & diuisibly cōstrued. But Galen thinketh not good to number this bone among the partes of the head, but of the nostrils: if *Fuchsius* coniecture, in explicating this hard and depraued place (as he termeth it) of Galen, *Εκδιχεται δὲ τοῦτο ὅμοιω τιμὴ &c.* be acceptable. As they that be disposed to proue may read in the x. Chap. of his first booke.

But among the bones of the body, there are certaine destitute of proper circūscriptions & endes, which neuertheles are of the expert Anathomistes described, euen as though they were peculiar bones: neither not vnwo:thely among the number of the rest accompted. Of whiche sorte, is the bone called *ζυγωμα, ζυγωειδης, and ζυγώδης*, in Latin *Iugale*: for asmuch as they are the partes of two Bones, yoked together: beyng constituted of two procelles: wherof the one springeth from the vpper iawe, vnder the small corner of the eye, and the other from that part of the temple bones, where the auditoie hole is sited. These two procelles meting after a superinflected maner, are couerted and knit together by an oblique Suture. And so fashioneth one bone, like vnto a yoke, or rather a bridge, as I sayd before. Which is (as it were) a propugnacle, decred by nature for the safe lodgyng of the tempo:all Muscle. Wherefore by bounchyng or heuyng outward, it maketh for the purpose a hollow passage vnderneath it, not beyng of it selfe soft to receiue iniurie lightly, but hard, strong, and almost solid, to repulse eche damage boldly. For yet altogether in it selfe destitute of hollownes. Wherein *Vesalius* is of *Collumbus* reproued, for affirmyng the hollow portion of this bone to be boyde of marcy altogether. And in giuyng this reprehension to *Vesalius*, of necessitie he biteth Galen, who sayth, for asmuch as it moueth not, neither hath it nēde by hollownes to be made lighter: but is strong, thicke, and solid, boyde of marcy. *Leonardus Fuchsius* speaketh much of the great prouidence of nature vsed, in placyng the tempo:all Muscle vnder this Iugall coagmentation. For among all other Muscles, chiefly this (if it be hurt) causeth (sayth he) cōuulsions, seuers, caros, & dotage, for the vicinitie of the brayne, which onely the bone and membzans parteth, and of the originall producion of sinewes, of whose Surcles, it enioyeth oft the sensibilitie, as in copious order shall hereafter be sayd.

C.ij.

Beyond

Why the biff bone is full of holes.
The bone Ithmoides and why it is so called.

The reason why in a disease called Coriza the stile of smellyng is lost.
Lib. 3. de Vi. part.

How sauiours are discerned.

How superfluities are purged.

How the hedge or partition in the nose is made.

Lib. 9. Vi. part.

Fuch. Lib. 1. cap. 10.

The Iugall bone is both a portion of the bones of the head and of the vpper iawe.
Col. Lib. 1. cap. 6.

The description of the Iugall bone.

The first destitie of the Iugall bone.

The Iugall bone wanteth not his marcy, and therefore hath some hollownes.
Galen Vi. part. 22.

Lib. 1. cap. 8.

The dangers that ensue by the hurt of the tempo:all Muscle.

Why such dangers are their incident.

The first Booke of the

The second vtilitie of the Jugall bone.

Of the Ossicles or litle Bones situated in the Organ of hearyng. Galen knew not these Ossicles. The number of these Ossicles. To those two which Vesalius added a thyrd.

Where these Ossicles are found. The Ossicles of the organ of hearyng are wrapped in Membran. The figure of the first Ossicle.

The vse of the head of the first Ossicle wherefore the first Ossicle is called a Mallet. Why the second Ossicle is called a Stevie.

The description of the second Ossicle

The second is in figure like to one of the Grynders. The vse of these two Ossicles in the Organ of hearyng.

How hearyng hapneth.

Cap. 7. The situation of the thyrd Ossicle of hearyng inuented by Collambus.

The thyrd Ossicle is compared to a Stirrope.

Beyond all this, the Jugall bone was framed for a second vse, and vtilitie. That from him might procede, and depend the manfous, or eatyng Musclic. As other where is noted.

But before we take in hād to treat of the bones of the vpper iawne, whilst yet Opportunitie is offered, let vs a litle discours of Ossicles, & litle bones of the Auditorie organ. Of which, all the old writers before the tyme of *Vesalius*, were either ignorant, or els neglected to write. And of these litle Bones, the later writers that haue inuented them, haue numbred two and of them onely made their descriptions. But *Realdus Collambus*, since that tyme, a man no lesse expert then learned, hath by his singular industry, and narrow search, found (as he reporteth) a thyrd among the rest. Which thre orderly to decypher, consider that, among the bones of temples, there is a certaine processe (as I touched before) at the foundation of the brayne goyng forth, & extended after the maner of a beame, with a sharpe end, which is within hollow, like a caue or crooked Laberinthe, about the middle region wherof, are these Ossicles annexed to their Membrans. The way vnto them is by the Auditorie passage. Of which, the first that appeareth in the Interior part of the hole, is a litle long one, not vnlike the bone of the thighe, although in consideration of the end of the thighe, somewhat vnlike: neither is the head therof depressed, but sharpe poynted: this is of the one part. But in the other part, it hath a head long, and round. Furthermore it hath two Processe, like those which in the thighe we call the Rotatorie Processe: the sharpe and slender part therof, is fastened in a slender Membran, which reacheth both to it, and that likewise that followeth. The other part, which is thicker, and ended with a head, serueth to shake the same Membran after the maner of a Tympan, as the authours terme it. Wherefore it is called a Mallet or Hammer: not for the likenes, but the office sake:

Euen as the other that followeth, they will attribute to the similitude of a stedy, or anneld, for that it serueth in like turne, receiuyng the motion or stroake (after a certaine straunge order) of the Mallet lately declared. And this is the second Ossicle, called by the name of a stedy or anneld: beyng somewhat thicke in the vpper part, which sheweth the playne part of a stedy, and endeth in two slender and sharpe Processe, as it were two legges: of the which, one is sent to the third bone (which *Collambus* hath added and not superstitiously inuented) beyng in the sayd Membran aboue recited, & to the other seruing, detained, and placed. This he compareth, for the likenes of the thynge, havyng two rotes, one longer and slenderer, an other thicker & shorter, to one of the tæth called Grynders: not deprauyng it of the other name, for the office sake. Neither rashly hath nature ordained these ij. bones or rather Ossicles, so in their thicker part to respect, & mete together. For whē by the motion of the ayre, hearyng hapneth, the stroke therof is brought in through the passage, to these litle bones: by which agayne is made a certaine repercussio, to the discerning of the second that is made, by which meanes it is iudged. Wherefore it is requisite, that by the yelding of the Membran these bones should moue, and knocke together. As when the first bone, percussed by the stroke of the ayre, reперсuteth the other in manner of a mallet: Wherefore the second that suffreth this, is ended with the name, and office of a stedy: and where they are knit together, a crullie Cartilage doth couer them.

The thyrd, which onely *Collambus* mentioneth, lyeth in a certaine litle Cell somewhat round, within the Auditorie cauitie. Wherefore it must needes also be appertinent to the Organ of hearyng: it is both hollow, and also notably perforated, unitatyng the figure of a Stirrope: onely in this differryng, that it wanteth those holes, that Stirropes haue to be bound thereby to their saddles. But in stead therof, it beareth out a certaine round head which appoycheth the processe of the bone

bone called the Stedie. Wherefore, when these litle Officles among them selues are conioyned, and colligated after this manner, it is no case doubtfull, to denie them all seruiceable to the Organ of hearyng. Neither is there any questiō to the contrary in that to be demaunded. But this we must note, that wher eas *Vesalius* affirmeth them, because of their likenes, Solid: *Columbus* contrarily, will haue them Concauous and hollow, accordyng to their fashon in bignes, and litlenes. That is, that they be inwardly Pore, or Spongie, conteinyng like their propo-
tion, a small quantitie of marey: especially the first y. but the thyrd, for the ex-
cedyng tenuitie, to be Solid, he in no wise denyeth. If any man be desirous to ob-
serue the administration of these Officles, we are taught to seuer the bones of the
Auditorie passage lightly, and deuide or cut them by litle & litle, so that sembla-
bly (as it were in scrappynge soyt) openyng the way, till the cavitie be vncouered,
and that you come vnto the middle region (almost) of that Cell, nigh the Mem-
bran which there couereth and filleth the litle corners of that cavitie, you shall
see with small search, the fourme and manner of the thyng before described. And
this is sufficient, to certifie you of the small Officles, or litle Bones of the Au-
ditorie Organ.

Now we will conuert our talke to the fashon, makynge, and construction of
the vpper iawe, called of the Grecians *ἡ ἀνω σιαγών* or *γέφυρα*. Which, as te-
stifieth Galen, consisteth not of one onely bone, but of many, whereby the better it
may endure, & not to be altogether afflicted by the annoyaunce of some one part.
Col. therfore sayth, the vpper iawe is easie by the poynting of the finger to be de-
monstrated, but no bone or part more difficult then it to explicate in wordes: in
respect of the manner and figure, how many, and with what bones it is made: as
also how it is from the other partes of the head distinguished. But first note that
the vpper iawe, amongst all kynde of creatures, is exēpt from naturall motion,
the Crocodile excepted: whose vpper iawe is onely mouable, but the neither still
at rest: and the Popiniaye, who not onely moueth both at once, but seperately al-
so one after an other: which is notable truly to be obserued, if we searchyngly en-
quire amongst the deepest secretes of nature: since that one kynde of creature
varieth from all others so playnly, and in such a notable poynte. But onely thus,
as saith the afozenamed Anthour, we must content our selues to see the effect: al-
though we be ignoraunt of the cause. And very bayne it were to contend vpon the
vpper iawe of man, for want of motion, or to searche the cause why (like to the
Crocodile) it styreth not: since no commoditie (but in ridiculous manner to de-
fourme the face of man) might ensue by contraction, and of vgly wrinkles appa-
rance, which of necessitie must corrupt the fourme of the countenaunce, beyng now
to the beholders so acceptable, and pleasaunt. But to our matter.

Realdus Columbus accōpteth not sufficient, the reason I did lately extract frō
Galen. Which is, that the vpper iawe should not onely be made of one bone, but
of many, lest annoyaunce in one part might byyng disturbaunce to all the rest. But
also (sayth he) to the end that by beyng made of many, the Ligamentes produced
from his Sutures, might enter the construction of the Muscles, to make their be-
gynnyng more firme and sure: in like soyt, as in other places, they also are confir-
med by the Ligamentes, from Appendances procedyng. *Fuchsius* writeth thus
that it were necessarie the vpper iawe should be of many Bones constitute, be-
cause it is not euery where of lyke Soliditie & thicknes, but here gristelly, there
Solid, and in that place Spongie.

To giue you an apt number, of how many Bones this superio: iawe is natu-
rally contrued, I am halfe astonied. For neither (as I confesse) could I finde at
any tyme to be satisfied my selfe therein, nor amongst authorities, such congruet
opiniōs as might incite me to subscribe vnto: onely as it is sayd I will set downe,

That these three
Officles serue to
the Organ of hea-
ryng.

The Officles of
hearyng are not
Solid, the thyrd
excepted.
The administrati-
on of the Offi-
cles of hearyng.

The descriptiō of
the vpper iawe
promised.
Lib. 3. de Oss.
Why the vpper
iawe is not made
of one onely bone
Col. Lib. cap. 8.
The explication of
the vpper iawe is
difficillite.

The Crocodile
moueth his vpper
iawe.

Columbus first
said the Popini-
aye to moue ei-
ther of the iawes

Why the vpper
iawe of man was
not made to
moue.

In the creatyng
of mā nature had
care of the comy
fourme.

A second cause
why the vpper
iawe was not
made of one bone
onely.

Lib. 1. cap. xij.
A thyrd cause
why the vpper
iawe is made of
many bones.
Of the number
of the bones of
the vpper iawe,
This contrarie
standeth vpon no
deepe poynt.

The first Booke of the

In introductorio
sue Medico.

Lib. rr. de Vi. part.

Lib. de Of. cap. r.

Vesal. Lib. r. cap. 9.

Reald. Col. Lib. r.

cap. 8.

The description of
of the bones of
the upper iawe in
generall.

The peculie cir-
cumscriptio of
the bones of the
upper iawe.

The first bone of
the upper iawe.

Vesal. ibid.

Col. ibid.
The description of
the second bone of
the upper iawe.

Where the dis-
seale called Aegi-
lopa chaunceth.
Lib. ro. Vi. part.
cap. rr.
How the excre-
ments of the
brayne fall to the
nostrils.

Vesal. ibid.

The third bone
of the upper iawe
Col. ibid.
Vi. part. rr.
Galen reproved in
his descriptions
of the bone of the
cheeke.
Col. ibid.
The borders of
the cheeke bone.

take and leaue at your pleasure. Besides that Galen in diuers places, hath diuer-
sified his owne opinions, yet at length both he, and *Vesalius* after him haue consen-
ted, to make the number of these Bones xij. that is to say, on eche side sixe. But
Realdus sayth xij. as he hath euer obserued: that is v. on either side, and one odde.
Which is last of all to be declared: but first note how these bones by three notable
Seames, are seperated from the bones of the head. First by the vj. which down-
ward from the extremitie of the Coronall Seame, is caried vnder *Inguale* to the
extreme teeth, and ended at the Palate. The by the viij. Seame, which, beginning
at the hollowes of the temples, and crepping vpward, ouerthwartly deuideth the
face in the toppe of the nose. Last of all with that short & oblique Seame, where-
with those two Processes are committed together which constitute the bone placed
ouer the temporall Muscle, called *Inguale*. These bones so seperately haue their
circumscriptions after this sort.

The first, whose fashio is diuers, is committed to the ioynnyng and metyng of
four others. For in the hinder part it sendeth forth a Processe, which fashioeth
the one portion of the Jugall bone, beyng conioyned by an oblique Suture (as we
haue sayd before) to the Processe produced from the temporall bone. Afterward,
in the hollowes of the temples, by the benefite of the Cuneiforme or Cuncall
bone, it is committed to the vj. Suture, thence agayne, downwardes reflected to the
hymost teeth. It complecteth also part of the browe, & seat of the eye in the vpper
part. But in the neither part, with a notable largenes, fastened to the fourth bone
with a Suture euident in three places. That is to say, in the hollow of the tem-
ples vnder the Jugall bone: agayn in the fore region of the iawe, nere the cheeke:
& in the lower seat of the eye. And thus to say briefly with shorter circumstance.
This first bone, is first committed to the temporall Processe in the Jugall part,
secondly, to the Cuneiforme bone, thyrly to the bone of the forehead, & fourth-
ly, to the fourth of the same iawe.

The second bone of the vpper iawe is of all the rest smallest, and like a thymne
scale, in the inner or greater corner of the eye consistyng: where lyeth a litle peece
of flesh, which was created for this purpose, that the pituitous excrements expur-
ged fro the head vnto the eyes, might thereby be expressed to the nostrils. There
groweth those abscesses which the Grecians call *ayidras*, which, beyng neglected
in Chirurgicall administration, exchaugeth to a lachrymall Fistule, penetratyng
this bone. Galen sayth the excrementall purgings of the brayne, are receiued
by this peece of flesh in this angle sitid: to the end they might not fall vnto the
cheekes, but be intruded to the nostrils. This litle bone is ended in the vpper part
at the viij. Suture, which is often sayd to deuide *Os frontis* from the vpper iawe:
being here committed by the intercession of that Suture, to the bone of the forehead:
from which Seame, an other likewise after the hinder side of this Officle, dis-
cendeth: which crepping by the inferioz partes of the Officle, speedely also ascendeth,
through the Anterior side thereof vpwards, to the same Suture, that deuiddeth the
vpper iawe from the bone of the forehead. To say briefly, therefore, this thyrd
bone meteth in the vpper part with *Os frontis*, in the hinder part with the thyrd
bone of the iawe, but in the inferiour, and Anterior part, it is together with the
fourth bone of the iawe.

The thyrd, which Galen calleth *Os male*, is greater the the rest, but of straunge
fourme, and diuersly Seamed. This containeth and in it holdeth all the teeth on
the vpper side. Wherein with *Collumbus*, we must needes reprehend Galen, who
hath exempted from these, the foremost called the Incissorie teeth: as though be-
twene the Incissorie, and Dogge teeth, were some interceptiue Seame recurrēt,
which, as the same *Collumbus* affirmeth, is in Apes, & Dogges onely to be found.
But this thyrd bone truly is distinguished from the first bone of the iawe, by the
common

common Suture, cræpyng thzough the middest of the face, vnder the eye liddes, into the roundell of the eye: where we say, the first bone recited is committed to this thz: by upwardly it is seiugated from *Os frontis* by the vij. Suture. In the inner angle of the eye, it differeth from the second bone by the line, that compasseth all that Officle. But in what part it beholdeth the nose, it disioyneth from the bones therof by the Suture from the vij. descendyng: and vnder the Palate, from that bone which we will call and nûber for the fift, by a great & notable Seame, which marcheth ouerthwartly (sayth *Realdus*) thzough the Palate: where also you may finde the line, that thzough the longitude of the Palate is deduced, rpsing by wardes betwene the incisio:ic teeth vnto the bottome of the nose, where the intercisio of the nostrils is made: by the meanes of which assurgent line, this present bone is into a right and a left part deuided. In children the trasuerse Suture in the Palate, which ouerthwartly on both sides enbeth at the Dogge tooth, is in elder persons quite abolished, so that the tracke therof may not be found. Lastly vpon *Sphenoides* or the Cuncall bone this bo: d:eth, where the vij. Suture, after it hath deuided the first bone from the tempozalles, departeth into a large cauitie, where it is dissipated & waisted, vntill it appzoch nere to the outer teeth. Besides all this, and that it is in diuers places Spogious and perfozated, this thz: bone or *Os mala*, wherof we make this relation, conteyneth in it selfe a very large cauitie, tenderly walled on ech side with thinne scally bones, for no other purpose the for lightnes so ordained of nature: so far as hitherto is noted. By these Bones hetherto described we may gather: what bones do necessarily come to the constituting of the seat of the eye. For *Os frontis* maketh the vpper part, and the halfe of the inner angle: the rest of it is added by a portion of the thz: bone, which is ioyned with the Bones of the nose: the inferiour, and outer corner the first bone wholly layeth. In that appertaineth to the interior part of the eye, the second bone, *Ithmoides*, and the Cuncall bone do minister their materiall ayde the which seat of the eye, because it is exculpured round, the *Iunior* sort do call a Roundell.

The fourth bone of the vpper iawe *Collumbus* calleth that, with *Vesalius* w:z: teth for the vij. which occuppung no small scope, admitteth the distinction of that Suture, which we haue named to cut the Palate ouerthwartly, endyng where the nostrils stretch into the iawes. It is deuided furthermoze with the Cuncall Processes, which we haue compared to the wyngs of Battes: by the benefite of the vij. Suture runnyng to the insides of the teeth.

The fift bone constituteth the vpper part of the nose, which is the true bonnye part, beyng double, but in the lower part is gristely: wherfoze neither stroke, nor fall, may shew any such rigour thereto (although it be very incident to such casualties) as if it had bene otherwise made of bonny construction. Therfoze that part of the nose that is bonny, is by a middle Seame to a right and left part distinguished, beyng committed to *Os frontis* betwene the browes by the vij. Seame, oft before mentioned: but in departyng downward on either part, it is ioyned with the thz: bone by the common Suture of both. Agayne in the inner part, where both these bones are vnited with the common line, they cleaue to that diuision, which we haue sayd to be part of the bone that assimulateth a searse. And thus much as touchyng ten of the xij. bones of the vpper iawe, for accordyng to the descriptio of the v. rehearsed, and appertinet to one side, you haue no lesse to attribute to the other side also, by which computation your number shalbe true.

The xi. bone, which it hath liked *Collumbus* to adde, is sited aboue the middest and inside of the Palate, within the streites of the nose, and is seuered frō that part that toucheth the head, after the whole longitude therof, by a broad cleft, whose biforked or clouen foundation, where it is thicker, lyeth to the Cuncall bone, as also extended to the constitution of the lower part of the nostrils diuision. Which

The transuers
Suture vnder
the Palate is
only in child.

The substance of
the cheeke bone.

The large cauitie
of the cheeke bone
and to what use.
Of what bones
the seat of the
eye consisteth.

Cap. 8.
Cap. 1.

What is the vij.
bone of the vpper
iawe, and the des-
cription therof.
The Processes of
Ithmoides like the
wyngs of bates.

The fift bone of
the vpper iawe.
The details of
the Cartilaginous
constructs of the
nostrils.

The end of the
fift bone.

The descriptio of
of the xi. bone of
the vpper iawe.

The first Booke of the

The xj. bone is likened to a plow share without a handle, and with an indented or unequal edge.
The Spongie bones in the nose are easily eaten away with the Spanish disease. Columbus alway found xij. bones in the upper iawe

The neither iawe is made of one bone and not two as Galen would.

Exception that in children it is two

Lib. x. cap. 9.
To what end the neither iawe is two in children.
The figure of the neither iawe.
Why mans face is round.
Why the neither iawe of beasts is so long.

Why the neither iawe consisteth of an hard bone.

Wherefore sette the cause of the neither iawe.
The ii. Processes of the neither iawe.
The use of the sharpe Process.
The description of the second Process.
The use of the Cartilages serving to the second Process, and his cavities.

Why the neither iawe is rougher in the fore part.
The brittle of his holes.

The Celles of the teeth.

notwithstanding (he sayth) is easie to be deuised. The fourme therof imitateth the fashon of a plough share.

To these may be added a ry. and riy. beyng two spongy fashioned bones collated on the inside of the nose, where the filth is retained: and these sometymes through erosion (as diuers Practitioners can auouch, their patientes labouryng with the Spanish disease) fall downe, and are ruined.

I haue (right willyng Reader) in the delineation of these bones, imitated somewhat narrowly the iudgement of *Columbus*, because, in the inuention of the upper iawe bones, he triumpheth ouer all before his time. Nevertheless, if any man of graue iudgement, shall deeme it needles to contend vpon such scrupulous, and sharpe poynted diuision, as this is: in the lyke respect, I will not resist: onely this I say, the truth is to be embraced, and the true inuitor accordingly reuerenced. Thus, the upper iawe decayed, you note how of many bones it is construed, and so, as the right perfect Anathomiste findeth sufficient trauaile to distinguish them aptly.

If the neither iawe it is nothyng so: for although *Galen Lib. iij. de Anatomis administrationibus*, would haue it consist of two bones, as in *Dogges*, and other Beastes, yet it is certaine that of one bone is made the neither iawe, without distinction, or dissolution: except in Children onely, who by hauing in the utmost part of the chinne a lineall ascense, perhappes incited the other opinion, of the like beyng also in all sortes. But to be in Children *Columbus* auoucheth it expedient, onely for the exiture of Ligamētes, needfull to the Muscles in those parts adiacent. The fashon of the neither iawe is Orbicular like a halfe long Circle, the utmost endes wherof are ascendently reflected. Neither hath nature, as in other creatures, so long created it, since handes hath man to reach at neede, but beastes, by the length of their iawes, metely apprehend euery thyng with their mouth. Correspondent to the comley figure of the face (also), is the roundnes therof, whereas the heades of other beastes are more depressed, and flatted, decent for the long shape of their iawes. Vard also it behoued this neither iawe of man to be, for the strong vse and actions that it hath: yet, together with the hardnes, it retaineth not such Soliditie, as might be an impediment to the light and ready motion therof, but hath on eche side proper cavities with maree infarced, though (in man) not so much backwardes sited, as in fourefooted creatures. And except those concaued places, the other partes are Solid, and very durable: yeldyng before in the thynne, called *γινεον*, hollowes, proper to the conteinyng of Muscles. At either end of this inferiour iawe are two Processes, as it were y. hornes, wherof the first is slender, and poynted, receiuyng the tendon of the temporall Muscle: But the other rising with a necke, and headed, transuersly is inserted to the angle correspondent to his proportion: beyng so Articulated with the bones of the temples, betwixt the rote of *Iugalis*, and the Auditorie hole. The head of this Process, and the cavity it entreteth, is couered with a crusty Cartilage: & betwixt the hollow, and the same Process, intercideth a certaine soft and mouable Gristle, which serueth not onely after the maner of a Ligament, to containe and hold the same in his proper Cell, but also maketh the motion of this manner knittynge more easie, and swift, without metyng and frettyng of the Bones. The fore part of this iawe is not onely rough, whereby the Muscles there might more cleuyngly grow, but also hath his proper holes for the entraunces of veynes, arteries, and Nerves.

Moreover as the upper iawe, so hath this (beside those holes) very many Celles and canities, which, how proper they are to the holdyng of the teeth (so necessary instrumentes for the susteinynge of nature) who knoweth not. These Celles (*Columbus* sayth) in aged persons after the fall of teeth, are done away, and shut

by so, that once among many other tymes, he reporteth he found not the places of two or three: so were they, and with such Soliditie that by.

As touching the teeth, it is certaine, that the number of them in all persons is not agreeable. For some men haue 32. teeth, some 28. others 26. and diuers diuersly: the last recited Authoe writteth, that most commonly they are numbered 32. that is, 16. in the upper iawe, and no lesse in the neither. Which we will speake of. These 16. on a side (that is) are wont to be deuised into 10. partes: that is to say, *Molares*, or *Maxillares*, *Canini*, and *Incisori*. Which more playnly to decyfre, note that the four most foure are named *Incisori*, as touching their offices, so ordained to cut, and make the first bite in takyng of meate, being broad, flat, and sharpe, like the fashion of a Chissell, broader beneth then aboue. Next on eche side of these groweth *Canini dentes*, beyng in either of the iawes two, called so, for that they are round, and pointed as the Dogges: these beake the bite first, receiued in by the incisorie teeth.

Now of the Grinders, called *Maxillares*, or *Molares*, are five on eche side, both aboue and beneth. Which, accordyng to their names, are also made to grynd, and great a sunder finely the meate receiued into the mouth, no otherwise then as the mill stones that grynde the grayne, so finally these mince it in makyng & chewyng, beyng for the purpose broad, hard, great, and rougher: why they are rougher who hath not the reaso, since the waight and hardnes of Pillstones sufficeth not, without pecking and making rough, as oft as they become smoth. So these teeth (besides) are large and great the longer to endure, and the easier (by their brydth) to conteyne the meate in breakyng.

Hardnes to the teeth is a most conuenient propertie (which they haue not scantily, but playne thereby to be distinguished for all other bones in the body) not only requirynge such excedyng Soliditie for the swift diminishyng of the meate, but principally, that to the bodies vse they might detract a longer tyme. Which nevertheless would haue bene sufficiet, had not nature prouidently, & right prudently foresene the same, by enlargyng their growyng almost perpetually: that as they daily weare, so they might daily renew, and be increased in their places. Betwene euery tooth are euident distinctions, or hedges, ordained in the substance of the bone. Wherefore (as we haue sayd before) the manner of their situation in the iawes is named *Gomphosis*.

It is furthermore to be considered, that the implantation of the teeth is not in one, as an other sheweth. For the Incisorie, & Dog teeth are simply rooted, but the Grinders not so: for they of the neither iawe haue two, but the upper (commonly) with iij. rootes are endued: sometime also (though seldom) the upper haue foure, and the neither iij. Those next vnto the Dog teeth (I meane of the Grinders) aboue, may be found with two holes inbred, then, there answerable mates below haue but one, and those shorter then the other: so that the superiour, surmount the inferiour in the length, and number of rootes: because those are dependant, these euer sitting in their Celles: neither maruella though the hindmost Grinders haue shorter holdes then haue the rest, considering that their vse and labour is lesse, in Leuigatyng the meate, or whatsoeuer is els receiued into the mouth.

But now to speake somewhat generally of all the teeth, we say, by the probable assertions of the best forewriters, that from all other Bones (to the partes of mans body appertinent) the teeth do playnly differ in manner of wayes.

First in their hardnes, which we haue somewhat touched before, necessary to the Communion of meate, to be more expeditely done.

For the second difference I infer their sensibilitie, wherein they excede them most notably: the whiche propertie (as we haue hereafter in our Discourse of Nerves described) they obtaine, by the access of certaine Syacles from the thyr

f. j.

conjugation

where the Celles of the teeth do growe by.

The number of the teeth are diverse in diuers men. Col. lib. 2. cap. 1. The number of teeth for the mouth.

The dogge teeth their vse and etymologie.

The teeth called Grinders.

Why they are rougher.

A reason of their brydth.

Why the teeth are so hard.

That hardnes was not sufficient to maintain the bone that they growe till the last age. Col. lib. 5. de com. med. secundum Loc. The teeth are in the iawes Articulated by Gomphosis.

Of the rootes of the teeth. The Incisori & Dogge teeth are simply rooted. The upper Grinders haue alway more rootes then the neither, and the reason why. Why the hindmost grinders haue shorter holdes. What differences are betwene the teeth and other bones.

1.

2.

How the teeth are made sensible,

The first Booke of the

Why other
bones haue no
sense.
The nerues that
runne through
bones of Skull
and Vertebres
giue them no sen-
sation.
How much of
tooth hath sense.
Why part with
in the Gumes for
teeth.

That it behooued
not the bones to
feele.

That the teeth
haue sense neede
scarily.

How teeth are
decayed.

If Nerues be in-
serted to roots
of the teeth, they
must needes haue
sense.

Ouid, Lib. 1.

Lib. 5. de comp.
secundum Lo.
The teeth haue
payne and pulsa-
tion.
The cause of pul-
sation and payne
how they feele &
are nourished.
The third differ-
ence between the
teeth and other
bones.

3.

How longe the
teeth doe grow.

How the rootes
of the teeth are
perfected, and
to what ende.

coniuatiō of the Sinewes of the brayne, disseminated. Which, crapping in at the
rootes of the teeth, giue vnto their substance the worthy facultie of feeling: where-
as other Bones admitte no portion of Nerues into them, although diuers passe
through them as some do through the Skull and Vertebres, for the transfusion
of sense into other partes. Their sensibilitie (notwithstanding) is not to be attri-
buted to their vniuersall partes, as those also that are already in sight, and promi-
nent forth of the Gummies: for such places of the teeth *Columbus* proueth (by the
testimony of his familiar *Iho. Baptista Mazzolari*) to be voyde of sense, and so
much as is infixed within the Gummies to be perfect sensible, by vertue of the
Nerve extended to that region. Wherefore their Assertions are odious, and most
lothsome to aunswere, who fantastically sayne, that all Bones are sensible, or els
the teeth also destitute of any feeling: as though it were asmuch requisite for the
Solid partes of the body, and such as, no otherwise then the frame worke of a
house, do suppozte, the other members should retaine as delicate sense as other
partes & Organs of the body, whose functions without the same, were frustrate,
for who knoweth not (as I haue also other where said) how incōmodious a thing
it were, if the sense of feeling should be imparted to the bones: whilst so no man
might endure halfe the vigour of his bodys motion, without intollerable payne
in all partes. Contrariwise, who doteth so much as that he will not know, the
transfusion of sense into the teeth to be necessarily taken: that thereby they might
reueale vnto the common wittes the outward, or inward annoyauce, which
might corrupt or destroye their proper substance, either by eruption, ero-
sion, heat, or cold, considering how needfull they are to susteine nature, and how
necessary to the comly fōurme of the countenance. And we see it hapneth (many
tymes) that they are ruined, by such cructable tormentes of Rheumaticke incur-
sions, or other like affectes, that no Medicin may preuaile to procure the patients
ease, till the same dolorous tooth be extirped & plucked vp by the rootes: at which
seperation, and departing from the sensible Surcles or twigges of the Sinewe &
foresayd, how paynfull it is, I referre it to the sentence of them that haue tasted
the bitterness therof. And if any man will wilfully runne in such absurditie, as
that he will deny the insertiō of Nerues within the rootes of the teeth, to be of na-
ture ordained for any purpose, let him still lye drabond in dreaming doubtles, till
his senses be sopt in solitarie sobbes, to pine in pining, as the Poete seyneth the
transformation of *Cygnus* into the shape of a Swanne: for none are so obstinate
as the ignorant: the wise are alwayes consenting vnto truth. Wherefore this
to them. *Galen* (who feeling the smart sometime him selfe) alloweth in the teeth
not onely dolor, but also pulsation. Whereto *Rosalus* readely agreeing, profes-
seth by publike dissection to haue rightly inuented the cause: since to every tooth
not onely a Nerve, but a Veine also, and an Arterie, are preferred: so that by ver-
tue of the sinewes the teeth feele, by the comming to of the Arterie they haue pul-
sation, and by the felowshipp of the veine are nourished: whereby they continual-
ly encrease: which maketh the last of the three differences, whereby I distingui-
shed the nature of the teeth from other bones. That is to say, that:

They are not onely nourished, but also perpetually grow: whereas the bones
euer cease to enlarge after the consistence of yeares. Whereof every man is ex-
pert. And according to the sentence of *Galen*, they augment, and are nourished
the space of forty and five yeares. But in *Lib. 5. de comp. Med. secundum loca*, he
sayth, they encrease almost the whole terme of mans lyfe. And thus much of the
triple fourmed difference. Now I will returne agayne to the peculiar proper-
ties of the teeth.

Among which, it is worthy to be noted, that all the rootes of the teeth are per-
forated, and persed through into the Celles or Cavities within the sayd rootes:
which

which are very litle, but most notable, to comprehend more aptly the partes, where by they are nourished, for at these holes the teeth receive, both the Veynes, Arteries, and Sinew lately spoken of. Which three vessels, penetrate and pearse into 8 litle cavities and foundations of the teeth, where they are complicate; & among them selves beget a certaine litle Membran, which sometyne receiveth of the Rhumaticke matter that from the brayne distilseth: which so oft irriteth the ingent dolours, and tormentes of the teeth, which seldom cease to perseuer with them, as long as that Humor in the sayd Membran is detepned: or untill of the Fluxion by purging the brayne, the cause be aptly consumed.

For cover, for so much as appertaineth to the generation of teeth, it is too thely approued, that not at that very instant when they issue forth of the Gummies, they are engendred: but rather the roote of their generation is in the infant, whilst it is swathed in the mothers Matrice, first begon, if experience may be a testimony sufficient to satisfie vs, or the authoritie of *Columbus* credible: the which rotes, or begynnings, preordained of nature for the after growyng of teeth, he professeth to haue inuented many tymes, and so oft as he had occasion to search in children that neuer were extract, or brought to light, as also in Abortes, bearing short the tyme of vy. or viij. monethes.

Furthermore, the first Dentition of children byngeth forth Appendances, which in Proesse of tyme (for the most part) fall away, and others with more sollicitie are produced in their places, which seldom so easely fall agayn. Wherefore in persons of ripper yeares I reckon no Appendances: Notwithstanding that in some, the fall of teeth are renewed at many yeares.

It needeth not to be inferred, since therein experience instructeth ech man sufficiently, how greatly they are apt to the modulation of speech. And that principally, the Incisorie teeth: which besides the aboue rehearsed, haue this propertie: as in persons full of dayes the like example is explained, in whom, the losse of one or two Incisorie teeth, yeldeth a perpetuall maine to their accustomed utteraunce. And this of teeth sufficeth.

But since in a later Chapter is expected a newe stile, and that I not onely profess more appertinent prolixitie then the rest of our Nation, that befoze haue traiailed herein, but also to haue for my guides the most princely Anathomistes of latter yeares: If I thus forsake, or breake of my descriptio of the head, in professyng to open I should but shut, and in meanyng to discouer I should but hyde the light, for as touchyng the Holes of the head, and such Perforated places as yeld no lesse pleasure to the passage of Veynes, Nerves, and Arteries, then they inferre delite by indurpyng to those partes sense, nourishment, although the auncient sect of Anathomistes, and *Galen* himselfe haue pretermitted occasion to enterlace among their other discourses the description, and offices of these holes in the head: Yet *Rosalius* giueth the onset in this enterpryse: who *Columbus* hath followed: no lesse laudpyng the dexteritie of his witte, and singular inuention. I therefore syn dyng in them both so much matter for the purpose as I could withe, and the tenor of their treatise to present such a summe of excellencie, as that the ignorance of this case, byngeth forth no small obscuritie to the vnderstandyng of the Historie of Veynes, Arteries, and Nerves: concluded with my selfe, to imitate the type of their Assertions, as also (in other cases) I haue written with their consentes, as it seemeth worthy. Wherefore, considering that nature created the bones for the cause of the other partes of the body, as we haue sayd, it was also requisite, that so they might be fourmed, as not onely the other partes might aptly be fastened vnto them, but somewhere also to penetrate their substance, for their safer defense. Which nature wisely wayeng, no otherwise, then as her accustomed providence is apparaunt in all thynges, hath in the Bones diuersly,

Of the Membran in the rootes of 8 teeth.

How becoment paines do happen in the teeth.

That the teeth as engendred in the mothers wombe although they appeare not.

Lib. 1. cap. x. Columbus tried it in newe boyne and in such Abortures as came by of viij. monethes ere due tyme.

The teeth haue Appendances which fall away.

The last villins of the teeth.

How we prone the last villins.

It will be expected that I omitte nothing, since I haue promised 8 whole History of man.

How necessary is the knowledge of the perforations of the Skull.

Galen write not of the holes in the Skull, that is evident.

How incommotions is 8 ignorance of these perforations.

That bones were made for 8 cause of other partes.

The first Booke of the

Why the bones
are perforated.
Of the holes ser-
uing to the vi-
conuagation of
Sinerues.

Col. Lib. 1. cap. 11.
1.

The holes ser-
uing to the first
conuagation of
Sinerues.
Sphenoides like a
cell of seat cras-
sed in the foun-
dation of the braine.
The hole of the op-
ticke Sinerue.
Why it is called
the opticke Sinerue.

The holes ser-
uing to the second
conuagation of
Sinerues.
That the second
conuagation of
Sinerues mo-
ueth the Muscles
of the eyes.
The description of
the great rift in the
lower corner of
the roundell of the
eye.
The way of the
Sinerues from the
third conuagation.
The use of the hole
in the browes.

How teares are
engendred.

4.
The hole in Spha-
noides.
The originall of
the muscle called
Masseter of Man-
sonus.
A branch from
the vi. conuaga-
tion to the Mass-
eterall Muscles.
A branch of the
vi. conuagation to
the eyes to the face.

5.
An other hole in
the Cuneall bone.
A branch of the
third conuagation
to the teeth and
temporall Mus-
cles.
The vii. conuaga-
tion of Sinerues
downe to the coate
of the Palate, &
superiour part of
tongue.

6.

here, and there scattred Holes, for the seruicable entrance of the aforesayd Ves-
sels: as in the bones of the head are to be described manifestly. Amongest whiche
briefly to enter, it behoueth first to begyn at those, which serue to the seuen payze
of Sinerues procedyng from the braine: forasmuch as, of all other Sinerues in
the body, or produced from any part els, they are most noble.

In the inner seate therfore of the skull, where *Os Cuneale* is insculped like the
maner of a seat, or stole, which is the foundation of the trayne: and nere vnto the
Processes supereminent of the same seate, are two Holes forced through the same
Cuneall bone, that is, a left and a right, stretching into the seates of the eyes, and
into their rootes penetratyng, nere to the sides of the inner angles. Through
this hole on eche side, issueth forth a notable great Nerue, called the Opticke Si-
nerue: wherof we haue made mention in the Historie of the Eyes: which like vnto
a roote, is implanted into the middle of the eye, for the transpoytyng of the
visible vertue thereunto.

Nere to the borders of these, is a Semicircular hole, or sometyme like a per-
fect round compasse, through which is caried the second conuagation of Nerues:
thence deduced through the great rift, into the eyes: inspyryng the meanes of mo-
tion to their Muscles. This great rift is that which in the lower part of the round-
bell of the eye, and towardes the region of the outer corner, beneath imitateth the
fourme of a round hole, but beyng in the upper part broken, is extended into a
long and ample cauitie, which not onely yeldeth passage to the second conuagati-
on of sinerues, which are disparcelled for motion sake among the Muscles of the eyes,
but also to other branches deriued from the third payze, hence disseminated a-
mong the partes of the face: going forth by the holes insculped in the browes, aboue
the inner angles. Furthermoze this cleft is the seate, proper to the Muscles of
the eye, which thence fetch their begynnyng, admittynge Veynes, and Arteries,
transmitted to the eyes: and to the nourishment of the Muscles of the eyes.

In the inferiour part also of this large cleft, where it is round, and towardes
the inner angle lurketh a hole, which creepeth as with a blind way downe to the
Palate, and nostrils: through which the subtil moisture of the braine, first recei-
ued by the Glandulous substance sited within the roundell of the eye, lydeth
downe naturally to the sayd nostrils, and Palate: the which liquid matter because
it falleth: first into the rift pertainyng to the eyes, it may be coniectured the
meane whereby teares are engendred.

Vnder the same rift, in a more crooked region of *Sphenoides*, a little space be-
twene, is discerned a hole on either side, makyng a crooked recoil from the seate
of the same bone, which beyng after a certaine maner rodd, is also long, scampyng
directly to stretch straight into the seat of the eye: reflecting neuertheles towardes
the sides where the temporall Muscle is, as also the originall of the Masseterall:
through which hole, a branch of the vii. conuagation taketh direct incurse into
these Muscles, afficiated in like maner which part of the third conuagation, tras-
fused through the lower part of the eyes to the face, no lesse mingled with the
Masseterall, and Muscles of the temples.

Beyond all this, in the same Cuneall bone is an other hole deried, beyng ap-
pertinent to the aforesayd partes representing the winges of Battes: through
which a portion of the third payze of Nerues is transmitted to the teeth, and tem-
porall Muscle: but not alone, nor without the company of the fourth conuagation,
entryng the same hole downe to the tunicle of the Palate, and superiour part of
the tongue, for the cause of tastyng.

Nere to this perforation or described hole, at the roote of the temporall Bone
(which is eminent inwardly like a beame or posse, the better to containe within
it the noble laberinthe of hearpyng, as before now we haue largely touched) an o-
ther

ther greater hole appeareth, as it were broken, rough, & vnequal, tending down-
wardes, giuing issue sufficient, for the Exiture of the thyrd conuigations portio:
wherchy also no more stoppage is offered, to a branch of *Vena singularis* that nour-
risheth the Anterior partes.

But departing a litle aside, somewhat more towardes the tempoꝛall bone, a
very small hole approacheth to the sight, which for the litlenes therof, is many
tymes (I meane in some Scalpes) not found. Wherfore to speake therof, in such
as you shall happen to finde it, note, that nature committeth thereto the safe con-
duict of slender twiggges of Veines, & Arteries, to be distributed among the partes
of the thicke Membran of the bꝛayne. But being denyde of this passage in some,
with no lesse labour they take their way, through the large and vnequall hole
before described.

From which large hole, not farre, an other hole, not very conspicuous in the
inner part of the skull, appeareth, and is noted by a round cauitie, and long en-
ding at the aboue named hole, plainly appearing vnder the Interiour rote of the
stillfourmed Procelle, and obliquely euident of shewing his way towardes the
Anterior partes: which ought to be the progresse of the sleepe Arterie, whereto
nature made and prepared such passage.

In the same tempoꝛall bone a place is perforated, scantly long in the toppe
or outer part, penetratynge the laberinth with a blind and difficult conduict, fi-
nished at length in the extreme region of the eare: being called the blind hole, in
consideration of the obscure passage: herein maketh entraunce the first payre of
Sinewes of the bꝛayne, as the immediate Organ to induce the faculty of hearing.

Under which hole, betwene the tempoꝛall bone, & the hinder part of the head,
is a large and vnequall hole, through which is deduced the by. payre of Sinewes:
which stretchynge doونه to the bowels, make in the meane space the recurrent
Nerues, not meanelly profitable to the fourmyng of speach, as we haue not forgot-
ten in our Discourse of Nerues. So lesse seruiceable seemeth this hole to the Jugular
Veine, suffryng the ascense therof for the nourishment of the bꝛayne: the which
Veine also fasteneth to *Dura mater* being carped forth with a double windynge,
and finally falleth into the Posteriour part, the bone manifestly giuing place to
it: that is to say, containynge a profound cauitie towardes the Labdall Suture,
crooked after this maner.

In the bone of the hinder part of the head, nere to the hole of all other, within
the skull the greatest, we finde one not very large, where through the by. conuig-
ation seeketh way: chalenged partly of the tounge, partly of *Larynx*, and partly
of the tempoꝛall Muscles.

Now we come to the greatest hole in all the head, which being in the same
bone as is the last recited (at leastwise among the holes of the inside of the head
it appeareth as is sayd, but to compare it to them on the outer side of the skull, is
to be esteemed scantly so ample and large as the roundell of the eye) is sited in the
middest, because it hath no mate. And it is ordained of nature, for the descension
of the spinall marie from the bꝛayne.

Betwene *Os frontis*, and the middest of the by. bone of the head named *Ith-
moides*, is a cauitie rather than a hole, where the thyrd Cell or Vetricle of the hard
Membran of the bꝛayne, is firmly settled.

Peruerthelesse besides this, in the same *Ithmoides*, nere *Os frontis*, are two litle
long holes or riftes, rather finishynge, and fullfylling the endes of the Organ of
smellyng. But these not all: for in *Ithmoide* are yet many other litle perforated
places & chinkes, as it were the small sifting holes of a searse, ordained aptly of
nature for the purposes, which we haue not in their proper places pretermitted.

To speake of *Os frontis*, in the region of the browes we finde two holes, on each

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side,

The hole serving
to a portio of the
ij. conuigation of
of *Vena singularis*.

7.

A litle hole which
is sometime abse.
See the intell.
of nature where
this litle hole is
wanting.

The hole of the
sleepe Arterie.

9.

The blind hole.
The first payre of
Sinewes serueth
sense to the Organ
of hearing.

10.

The by. conuiga-
tion of Sinewes
to the bowels.
The first conuig-
atio maketh the
recurrent Sinewes,
which toyme the
bowels.
The inner Jugula-
ris nourisheth the
whole bꝛayne.

11.

The hole to the
by. conuigation
of the bꝛayne.

12.

The greatest hole
in the Occiput and
the bse thereof.

13.

The bse of the hole
betwene *Os fron-
tis* and *Ithmoides*.

14.

The holes of *Ith-
moides*.

15. 17.

The first Booke of the

The holes for a
portion of the 11.
conjugation, to the
Muscles of the
forehead and eye-
lides.

18. 29.

The cavities in
Os frontis.

In the cavities
of the forehead
much ayre, some-
tyme, sithe is
founde.

20.

The holes of the
cheeke bone.
A portion of the
11. conjugation of
Nerves to the
Muscles of the
nose and lippe.

21.

Whence is
the defect
to the nostrils
and eyes.

The place where
Aeglops called
lachrymall fistule
happeth.

22.

Why the eye par-
tic. the temporall
Muscle may be
affected.

The holes in the
face.

23.

The roundels of
the eyes.

24.

The holes of the
nose.

25.

The Jugall bone
like a bridge.

26.

The seat of the
temporall Muscle.

27.

By what parte
Aeglops defecteth
to the moving
of the Palate.

28.

A portion of the
11. conjugation
endowing & coate
of the Palate with
the sense of tastynge.

29.

Of the holes of
the neither iawe.

30.

side one, through the which, a portion of the 11. conjugation of Nerves, is sent unto the Muscles of the forehead, and eye lides.

In the forehead moreover, above the toppe of the nose, (where the skull disjoyneth in such sort, as it seemeth to be efformed of two scales, outwardly, and inwardly) are contained two notable cavities, mentioned somewhat before in the circumscriptions of the bones of the head: which Celles, I have there noted to represent this proportion. They have entrance into the nostrils, and containe nothing but a Membran: except it be sometyne superfluous filthe, and ayre, sometyne, as it is supposed. But surely they seeme altogether unknown of the ancient Anathomistes, in so farre as in all my tyme I have read: the use of them, in retaining ayre, is other where to be declared.

The bone of the cheeke under the region of the neither eye lides, hath a round hole, which beginning at the inner and inferiour part of the roundell of the eye with a long and deepe chinke, endeth towards the region of the first tooth of the grinders: through which is transmitted a portion of the 11. conjugation of Nerves, belated to the Muscles of the nose, and those that constitute the lippe.

There is a large issue in the lower part of the greater angle of the eye, forged betwene the second and 11. bone of the upper iawe: and here hapneth the descent of moyste matter unto the nostrils, before lodged in the inner angle of the eye, where a certaine Glandule (for the purpose) is prest to receive the same. In this place is engendred the lachrymall fistule, called also *Aeglops*.

But contrariwise in the exterior and lesser angle of the eye is a large rift, and long, partly perforating the bone of the temples, and partly of the upper iawe. Hereto is fixed the temporall Muscle: which therefore to the eye hath no small affinity. So marvaile therefore if the eye in dolour labouring, this Muscle sometyne be affected also.

In the face first we note the two holes, or roundels of eyes: which for asmuch as they are sufficiently knowne of all men, to be unto the eyes most proper habitacles, I neede not long detract the tyme.

But somewhat lower, and betwene them both, are the two holes sited of the nose, which have recourse unto the iawes, and to the endes of the Palate.

It is knowne, and easely conceived, by mention made therof before, among the bones of the head, that the Jugall bone, made by the reaching over and meeting of two Processes, like the arche of a bridge, (as I have also compared it) maketh underneth it a hole, mete for the secure situation of the temporall Muscle.

There is in lyke sort one hole in the middle of the Anterior part of the Palate, mete in a line nere to the Incisorie teeth: where through not onely a Veyne, but also an Arterie pearseth. So also yeldeth way to the letting in of liquid humors, fitte to humect, and make moyste the Membran of the Palate, which to that hole is bound, after the fashion as *Dura membrana* is knit to a little hole somewhat above the disfaunce of *Isthmoides*.

In the extreme end of the Palate, not farre from the hindmost teeth, is found on each side a hole in the fist bone, which we call the fourth of the superiour iawe: the whiche hole is produced into two sharpe corners, admittynge together with a Veyne, and Arterie, a portion of the fourth conjugation of Nerves: making the triangle of the Palate to participate with the sense of tastynge.

Yet further, the neither iawe (which although it seemeth needlesse to describe the maner of holes therein situate, for asmuch as so particularly I have touched them before in speaking of the neither iawe: I will nevertheless thinke tyme evill spent to rehearse them agayne amongst the holes of the head, because part in present occasion to be revealed, and part hidde, should not sound aptly to a perfect description): hath two holes on eche side, those of the inner side being larger then

the of the outer. By which, both Veynes, Arteries, and Nerves are sent to the singular rootes of the teeth, with lyfe, nourishment, and sense: a portion of the which Nerue goeth out vnto the chinne, and Muscles of the neither lippe, by these two holes that be on the outer side mentioned: to finde out the way of the which conuagation and portion, transmitted to the temporall Muscles, it behooueth to finde out the double hole in the foundation of the head in that part (I meane) of the temporall bone, which is next vnto the Cuneall bone.

And in the hinder roote of the Processe *Styloides*, is easily discerned a hole, by which a Veyne and Arterie maketh entrance to nourish the Organ of hearyng. Nighe to the Mammillar Processe, in the hinder part, is a way for the comming in of Veynes, and Arteries: which to nourish the Bones, we account it no wayne seruice.

Besides all these notable holes, and euident to be described for the most part, let it not seeme tedious vnto you, to consider, that in the head and scope of the skull are yet diuerse and sundry little Perforations here and there disparled, which for there unlike beyng, and variable order, it seemeth a thyng impossible to make of them direct description: although it can not be denyde, but their vses are exquisite: for as touchyng the conuent of Veynes and Arteries, within the inner scope and capacite of the head, and such as passe to the thicke Menbran: the lettynge in, and entrance by the sayd holes, as they are necessary, so vniue almost in euery one. It auayleth not much to remember vnto you the seates, or Celles of the teeth, sufficiently discoursed before. For not, for the number of holes are made the lyke number of rootes, in teeth, but rather that nature, for the nuber of the teeth, created the number of places agreeable.

It needeth not to be doubted since the thyng is most certaine, that as the frame of bones in man are exceeding requisite to the supporting of the members, so are they no lesse acceptable to the insertion of Muscles. Wherefore in the toying (which nature created for so many good considerations, beyng made of such soft & fleshy substance) it were expedient to haue effourmed some bone, whereto (most aptly) the Muscles therof might be affixed, and tyed: as a ground woork, or stabiliment to susteyne the whole woork. Which, prouident nature (whose foresight in all thynges is unspeakable) perpendyng, and willing to make a member so seruiceable, indigent, or needfull of nothyng to maintaine the perpetuall of his action, insired in the roote therof a bone, not fashioned after any common proportion, but so rare, as that place required most notably.

Wherefore accordyng to the proportion therof, so the Grecians have named it, that is to say, for asmuch as not a little it resembleth the figure of the Græke letter ν it is called $\nu\psi\lambda\omicron\upsilon\delta\epsilon\varsigma$, but with more contraction of speech *Hyoides*. It is not wantyng (as *Theophilus* testifieth) that some haue given it to name $\lambda\alpha\upsilon\beta\omicron\upsilon\delta\epsilon\varsigma$, though the more iniuriouly: for truly it hath no such streitnes in any bought therof, as appereth in the fashion of the Græke letter λ . but rather (as *Realdus Collambus* writeth thereof) it may be compared to the nether iaw. I will omit to speak of the diuers names, which diuers Authors diuersly haue therof imagined, and inuented: and so, as it may not vniuersally be surmised, the most of them neuer dissected the body of man but of beastes. But to our purpose.

Nature (as I haue sayd) effourmed in such sorte this bone *Hyoides*, that although it be situated to the iawes, and Organ of voyce, yet so that it giueth also free scope vnto inspiration, and to passage of substance, both meate, and drinke: the middle Officle therof is connected and knit to an other greater Officle in the Anterior part towards the mouth, where it ioyneth with a very Obruse or blunt corner: but the hinder part therof, which is more inward, and towards the iawes, is hollow in reflected or bowed manner. So about Gibbous, but in the in-

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seriour

To the rootes of all the teeth is carried a Veyne, Arterie, & Nerve.

A portion of the conuagation to the temporall muscles.

The hole to the Veynes and Arterie for the Organ of hearyng.

The small Perforations in the Skull are directed as touching these places.

The number of teeth obeyeth the number of Celles.

The use of bones.

Why to the body a bone was necessary.

Hyoides is a bone peculiar to the tongue.

Lib. 3. cap. vi. It is more rightly called $\nu\psi\lambda\omicron\upsilon\delta\epsilon\varsigma$ then $\lambda\alpha\upsilon\beta\omicron\upsilon\delta\epsilon\varsigma$.

Lib. 1. cap. 22.

The source of *Hyoides*.

The description of *Hyoides*.

The insertion of the tongue to *Hyoides*.

The first Booke of the

From the 200
to the 210
of the 210

Ad the 200
A consideration
of the Epiglottis

Whence spring
Muscles mov
ing the toung

Why Hyoides
hath more pro
cesses.
How Hyoides is
bound to the
Processes stylo
ides.
Hyoides is made
of b. bones.

The beuillie of
Hyoides construc
tion.

The wisdom of
nature, the pro
cesses being wan
tyng.

Col. Lib. 1. cap. 12.
Larinx is the head
of Aspera Arteria.
The situation of
Larinx.
The use of Larinx.

What partes co
curre to the ma
king of Larinx.

1. 2.
The number of
bones to Larinx.
How these two
bones meete toge
ther in the fore
parte.

What parte of
Larinx is compa
red to a shield.
Lib. 1. Cap. 38.

3.
How the Proces
ses of Larinx and
Hyoides are com
mitted together.
The 11. b. named
bone with the o
thers call the b.
named cartilage.



erious part hollow. And thus are the partes thereto fixed: as the Anterior, and Superior part admitteth the insertion of the toung, construct & made of 9. Muscles, whose small difference, is ended at a certaine Processe eminent in the upper part of this bone, about the middest of y^e bought therof: but y^e hinder & lower part of this bone, being hollow and round boiued, was for the purpose fitly forged, to give place to the opening & lifting vp of the little toung: which as a doore or gate is seruiceable to *Larinx*: & for that cause, called of the Graeces *Epiglottis*. To the borders of the sides of the middle of this bone: are annexed two other with two little long Processe, hauing also extreme Appendances: which, with Ligaments are fast knit vnto the Superior sides of *Larinx*: fro which Processe (no doubt) spring Muscles also, seruing to the motions of the toung. Moreover, because the strength of this bone had not bene sufficient, hauing but this one single insertion to *Larinx*: nature added two other Processe, though not so large as those before described: neare to which, these together arise: but in the upper part, where is the greater Ossicle sited in the middest, there it is ended. For by these Processe, is Os *Hyoides* fast knit vnto the Stilifourmed Processe, proceeding from the Temporall bone on each syde, with a notable strong Ligament: whereby it is so firmified in the middest, as to neither part it easily slippeth.

And thus of five bones *Hyoides* consisteth: the shape, situation, and construction wherof (as it seemeth to every man) was so well provided for, that as it is fastned to the iawes & to *Larinx*, so yet it yieldeth ample scope, not onely to breathing, and inspiration, but likewise to the transiture of meate and drinke, as is sayd before. *Columbus* writeth that sometyme the Processe are found wantyng: as for example on one side onely: whose places then nature supplieth with Ligamentes, longer extended, and stretched from the endes of the middle Ossicle, vnto the Stilifourmed Processe: so as euermore her worke is exactly finished.

Larinx (I know not properly what English terme to giue it) is the toppe of *Aspera Arteria*, or the heap therof, whiche reacheth by vnto the mouth and iawes: to the hinder part, and toppe wherof, we haue before affirmed the bone *Hyoides* to be implated, and committed. This *Larinx* is the Organ, by which we receiue and put forth breath, as also of making and forming voyce: as the description therof shall make it manifest vnto you. For to the forming therof cometh not onely bones (perhaps Reader thou wilt maruaile that I say bones, but read to the end) but also Cartilages, Ligamentes, Muscles, and Membrans: besides that I omit both Veines, Arteries, and Nerves.

The bones that come vnto the construction therof are in number 6. of which there are two the largest, that do constitute almost the whole body of it. In the hinder part they are largely distayned, but in y^e fore part united by a sharpe creest, or corner: as we may make comparison, like the setting together of the ribbes of a Lute: the Image of it assumulath a Shield, such as in tymes past, were perhappes used in the warres: and are used as yet of the Turkes, as *Vesalius* writeth: which caused the Anathomistes to call it, for the likenes of the thyng, *Scutaleum*, or *Scutiformem Cartilaginem*, or *Peltaleum*, the Gretians *επιγλωττιδα*.

The Posterior part therof both aboue, & beneth, putteth out from his sides two Processe, that is to say, aboue on each side one, and beneth on each side one: of which, the two uppermost are wont to be longer then the neithermost, and with Membranous bandes, are tyed to the lower sides of the Bones representyng the shape of y^e *Hyoides*: but the inferior Processe of this same Shield, are towards the posterior sides of that part, whiche other Anathomistes do call the second unnamed Cartilage, but *Columbus* maketh it the third unnamed bone: the forme wherof, is like the rynges, which y^e Parthians use to weare on their right Thombes, when they shote their arrowes, for the more strength they purchasse thereby.

thereby in drawing: for in the posterioir part towarde the stomacke, it is broader, & is extended into a sharpe. Furthermore the more forward that it goeth, the more also it is extenuated, & made slender, to the forming of the aforesayd figure, thus as in the margent depaynted. It putteth forth no where any roughnes, but onely in the hinder part some necessary Asperitie, serving for the insertion of two Muscles there beyng: which from this thyrd bone vnto the iiii. and which are directly caried: as in the Historie of Muscles shalbe declared. And this same bone nature exactly compassed, to the end it might be vnto *Larinx* as a firmament, and foundation, as also a certaine defence, & propugnacle to the rough Arterie: whose begynnynge it is: for vntill it should ioyne together in the inner part, neither could it be endewd with such hardnesse: whereby daunger might oft ensue by swallowyng any thicke, or hard thyng, lest it should presse together the way of respiration ouer strictly: whereby might come to passe suffocation. Euery where (therfore) this is made a continuall bone, to defend y^e rough Arterie more strögly.

The fourth, and fift bone of *Larinx*, *Collumbeus* calleth that, which the rest haue before him numbred for one, and the thyrd Cartilage. For if as he sayth you shall behold this part, the Membrans beyng taken of, wherewith it is couered, you shall discern it lose & deuided into two: wherfore he thought good also to distinguish it into two which rise from the toppe of the thyrd bone inwarde looking: for to this Tubercle they are inarticulated and knit, and thence from the foundation therof put forth two pynnes or wynges, which are coupled to the lower region of the Shield in the fore part, & constitute the rift so needfull to the modulation of voyce: vprwardes moreouer they tend into y^e Processes, whiche are mutually vnited the right with the left, & yeld y^e Image of a certaine vessel, where with we poure out water to the washyng of handes: & that chiefly (as I suppose) the part of the clyue where water runneth forth, that part therfore the Grekes call *ἀρυτανόειος*. These two Officles are vnequall, & together by a Ligament & a Cartilage vnited, and by the benefite of the Membran that so plentyfully is added aloft, they seeme to be soft: whereas they end in two Processes: which nature directed to vse as certaine litle tongues, not onely to close and shut the amplitude of *Larinx*, and way of the rough Arterie, lest any thyng (especially by vometyng, that might hurt) should slippe into the inner capacitie therof, and so fall into the Innges, but also that the same chinke might be guided, and vsed to the forming of diuers voyces: no otherwise then as is sene in Dypes and Shalmes, wherein are put certaine litle tongues, made of two Palates of reed: wherfore the vniō of these Processes constitutyng this litle tongue, is called *κλωψίς*.

To these are added one Cartilage no more to be neglected, which is in Greke *ἐπιγλωττίς* because it goeth forth in maner like the litle toung rehearsed, & labourerth to the end that no meate, or drinke flow into *Larinx*: and also is shut and opened, for the mutuall worke of inspiration, and expiration. This imitateth the fashion of a crooked litle Shield, beyng ample and large in the Superiour part, then by litle and litle wayyng narrow, endeth at a poynt: and is inserted to the Anteriour and Superiour parte of the Shield, whence it hath his begynnynge.

Here, in this description of *Larinx*, I imagine that surely the Reader will stand as in a mase, to see that newly called a bone, which heretofore, of all Anathomistes generally before *Collumbeus*, hath bene taken & described for a Cartilage: but maruaile not hereat so much, for neither hast thou cause, but rather to apply thy senses to the iudgement of the thyng it selfe: that thy owne eyes conferrynge it with the veritie of the thyng, thy selfe also may easily become a witness in this no doubtfull matter: which by these three poyntes thou mayst easily & quickly discusse: as it were at the first sight, and those are, Colour, the consideration and assay of their hardnes, and the medullous substance that inwardly annoynteth

Col Lib. 1. Cap. 12.
The figure of the
thyrd humaned
bone.

The Asperitie in
y^e bone for y^e inser-
tion of Muscles.

Why the thyrd bone
is thus rounde
compassed.

The 4. & 5. bone
is called the thyrd
Cartilage with
other Anato-
mistes.

The rift or chinke
which frameth
voyce.
What signifyeth
Arytanoides.

The vse of the 4.
Processes of the 4.
and 5. bone of *Larinx*.

What is called
Glottis.

The Epiglottis
what it signifyeth
and y^e vse therof.

The figure of the
Epiglottis.

This verely will
seme a strange de-
scription to some.

This meanes to
iudge of these
whether they be
bones or gristles,

The first Booke of the

Cap. Citato.
The principall
difference of the
bone and the car-
tilage.
It is manyle
that a thing so
manifest should
be omitted of such
famous men.
That in apes La-
rinx is of bones.
Lib. 1. Cap. 3.
A great like-
hode that Vesal.
dissected the Larinx
of man.

That Vesal.
dissected commo-
ly the Larinx of
beastes.
Nature is euery
where iust.

The structure of
the backe is wou-
thy admiration.

The composition
of the Vertebres
compared to the
ridgbeame of a
shippe.
Col. Lib. 1. Cap. 4.
The effeate and
motions of the
backe.

A further note in
the composition of
the Vertebres.

The necessitie of
the backe proued.
The incommen-
sures why the
back by this stru-
cture prouenteth.

What the body
were if motion
wanted.
How the body
should be strued if
all Nerues pro-
ceeded from the
brayne.

The necessitie and
ble of the spinall
marrey.

How the Nerues
are distributed.

teth them: which one thyng especially (sayth *Columbus*) distinguisheth, and dis-
fereth Cartilages from bones: for that the Cartilage altogether, and by the indige-
ment of all men, is destitute of any marrey. And by all those iii. thou shalt proue
this description very true: wherfore if (at any thyng) thou standest at a maruaile
let it be at this, & I wil be thy mate, that Galen, and chiefly that woorthy *Vesalins*
haue not marked it: for therein neither of them may be excused: since eue in Apes
(which Galen most dissected) it is to be found bonney, as *Columbus* affirmeth. And
Vesalins professing the proper description of mans body, hath neuertheless (as it
seemeth) neglected wholly the substance of this part, & yet, that he sought the La-
rinx both of man & woman, greatly appeareth, by that he proueth the shieldlike
bone (which he calleth *Scutiformis Cartilago*) to beare out in me more, & in grea-
ter fourme the in womē. Agayne, who would iudge but that he used so much dili-
gence, as to discern the difference betwixt the Larinx of man & beastes, & therfore
would describe the right, & not the other. And yet Col. (wherfore I cannot a litle
maruaile) writeth that *Vesal.* neglected the body of mā. for this part Larinx, & disse-
cted it of custome in beastes: yea and y in publicke Theaters, wherat he testifieth
him selfe oft times to haue bene present: but of this perhaps to much, onely y na-
ture in her woorks be not falsified: which be euery where so wōderful, iust, & true.

And that no where in all the partes of mans body, more exactly, and clearly
manifest vnto vs, then in the backe: the cōstruction wherof is not so maruai-
lous, as laudable to the high Parent, & Progenitor of all thynges. Wherfore, be-
fore I go forth to describe y singular parts therof, it shal not be onely more plea-
saunt, but also profitable vnto thee (gentle Reader) first to cōprehend in the depth of
thy cogitation, a generall sūme, & brief discourse of the creatiō therof: which thou
shalt note to be of the Grecians nominated πᾶσις, and ὠστρον, the Latins *Dorsum*, or
Spina, which our English phrase termeth the backe: which vnto y trunk of y bo-
dy is of right a fōundation, cōparable to the belly, or ridgbeame of a shyp, or boate:
whereunto the chief studdes, or postes of the frame woork are moztised.

No lesse needfull to the life of man, is the straunge construction of the backe,
wherby the true ambulative motion of the body is obteyned, forwarde, back-
warde, rounde, or laterall refection admitted & straight, or byright station, not
denyed. All whiche we haue by the benefite of the backe, nay rather, for that the
backe is cōstrued of Vertebres or Spondilles most exquisitely: which beyng al-
so together mutually concaued, make in them selues by strict Coarticulation the
close Cloysture, and safe Gallery for the Spinall marrey: which the Grecians cal
ὄσπιναιον μυελόν: which to haue bene created was most needfull: neither could it o-
therwhere more securely haue inhabited. To proue it most needfull vnto the
body, as euery where we haue professed, note this short Allegation: for we say,
if it had not bene, one of these y. inconueniences must necessarily haue hapned.
Either all the partes of the body vnder the head, to haue remayned vnmoueable,
or elles to euery part of them, Nerues from the brayne should haue bene dedu-
ced: But if all the partes (as is sayd) had bene frustrated of motion, then had the
body bene rather as an Image pictured of clay, or stone, then a liuyng creature.
And agayne if a small Nerue proceeding from the brayne, should be deuided, and
caried into euery part, with such long and vnequall distāces, it could not be that
their force in motion should haue bene sufficient, nor their continuance perdu-
rable. Wherfore, it was farre better that the Spinall marrey, as a riuer issuing
from the brayne his fountaine, should not onely be elongated after the bodys
trunk, but also vnto all the partes as it passeth, to send proper Nerues, as the
delectable brookes for feeling and mouyng. And surely so it hapneth: for y vpper
most deriuations seeke not out the nether partes, neither yet do the neithermost
Nerues exalte themselves to the highest iourney, but eche coniugation is aptly
produ-

produced to the next partes: as in perusing the Historie of Nerues, you shall easily discern.

Withens that the Spinall marey vnto all the partes beneth the head, is as it were an other brayne, it is no lesse behoufull that it were strongly enclosed with some hard and resistaunt muniment, to repugne all inturpes, offered to so noble a part. Wherefore to commit the same to the tuition of the Spinall bones, nature not rashly hath decreed: exculpyng, and grauyng in their substances, fit holes for the descense therof: and for that cause is the backe of man conflate, and made of so many bones, for the more safe keeping: of the marey: & to fulfill (with more facilitie) that maner of euery motion, wherof to the neither partes, that which they conteyne is the immediate fountaine.

Besides all this, the Spinall marey could not endure euery angular flexion, nor euery large and sodayne motion: but if the backe should haue bene made of large, and lofe ioyntes, neither might they haue moued, without great greuaunce and hurt: for a Coarticulation made of long bones, is for the cause of a large mouyng, which in such a place is requisite: but here, considering what is contrained, it was far more expedient that many should be their number: to euery which a litle motion should appertaine: so that euery one of them styrring a litle, of necessitie by that tyme all haue done their duety, the motion is sufficient large, and also easie: therfore so, rather then two or iij. bones, reason requireth: for by that number (we see by example in the Armes and Legges, the flexion is made Angular, and not Circular: that is to say, cornered, and not compassed: so that if the backe had bene in like maner, I meane of ij. or iij. bones constricted, and combined, great hurt, ruption, confusion, and continuall compression of the Spinall marey must needs haue bene procured, by the dayly motion of such few bones, so outrageously byged. Neither can we otherwise coiscture, but that the small number of Bones, should offer ouer readily occasion, vpon euery light motion to be dislocated, or rather Luxated: which would furthermore procure great perill of lyfe: the which kynde of Luxation that diuine *Hippocrates* well notyng, writeth thus, in his booke *De Articulis*. If many Vertebres do fortune at once to be out of order, or displaced, it will be very tedious and hurtfull. But if one of them be Luxated, and remoued from his fellow, the case then is most pernicious: and the reason is, that if one Vertebre be disordered, it so wryeth therewith the Spinall marey, as that it bygeth it to bolue into a sharpe corner, whereby it is compelled either to breake, or be byused: the lest of which, is pernicious in deede: and deadly, sozasmuch as the nature of this marey, is endewed with the nature of the brayne. Whereas contrariwise many Vertebres being luxated, or forced out of course, forceth it not so straitly, but into a more blunt boluyng, and Semicircled corner: which although it inciteth great distraction, yet not so easely (of necessity) endureth death. Wherefore I say, to pzeuent and forcessall all perils, and dangerous euentcs (so much as might be) for the necessarie, and healthfull procrastination of lyfe, the backe was construct and made of so many, and so short bones, to be made free, if it might be) from such like Luxation: as also that the bodyes of the Vertebres so effectually made, might (as I sayd before) not swifely but easely, neither sodenly but softly, be moued euery way: for in deede they are mouable, and that aptly to euery side. Galen sayth euery thyng that is vpholden or borne by an other, ought to be lesser, and therfore lighter then that which vpholdeth and beareth: which is the cause, that euermore the vppermost Vertebres are lesser then the neithermost. Wherefore *Os Sacrum* the seate of all the rest, likewise exceedeth them all in quantitie.

Hetherto how the Vertebres are a safe defense for the Spinall marey: which yet (beyond all that is sayd) we note to haue Processes, & not onely to euery such

C.ij.

partes

The Spinall marey as an other brayne.

Why nature committed the tuition of the Vertebres to the guarding of the Spinall marey. The Spinall marey the fountaine of sense to the inferior part. &c. Why the backe doth not consist of fewer bones.

Large bones moue largely and sodainly, but short bones litle and easely.

The Vertebres being short yet many in number make sufficient motion for the backe. The same is of ij. bones & therfore hath a sharpe cornered bowing.

The place of the Lib. de artic. How the Luxation of the Vertebres were to be leuied.

Why the luxatio of one Vertebre is more perillous then of many.

The Luxation of one Vertebre bygeth the Spinall marey into a sharpe.

The marey participateth with the nature of the brayne.

Many Vertebres Luxated bysgeth the Spinall marey into a halfe circle.

Why the backe doth consist of so many Vertebres Lib. de. Vi. part. Ca. 23.

Why the superious are lesser then the inferior Vertebres.

Os sacrum is greater then all the other Vertebres, The Vertebres haue processes,

The first Booke of the

The towne of the
Posterior Pro-
cesses is called the
Spine.
The use of the
Processes on the
sides of the Ver-
tebres.
The Processes in
length imitate the
degrees of the Ver-
tebres.
The use of the
Processes of the
Vertebres under
the ribs.
The Division of
the backe.

The Vertebres
of the necke are vij.
Of the Brest 12.
Of the Loynes 5.
Of Os Sacrum 6.
Of Cocci 4.

The number of
all the Vertebres.
Which and how
many are prop-
per Vertebres.
Why those vnder
Os Sacrum are un-
der amongst the
Vertebres.

The difference of
the Vertebres
after Articulation.
The necke is
made for the cause
of the rough Ar-
terie.
Lib. 8. De Vi. Part.
The necke is not
where the Lungen
are not.

Efflation is the
matter of voyce.

Larinx the instru-
ment of voyce.

Such creatures
as want nothes
are domme.
Aristotle.

Why the necke con-
sisteth of bones.
Why the necke
consisteth of Ver-
tebres.
Col. Lib. 1. ca. 15.
What is the necke.

Scull Vertebres
whereof the necke
dothe consist and
one of them diffe-
ring from another.

The use of the
necke.

partes as outwardly occupy the middle regio of the backe (which order is a prin-
cipall propugnacle to the same marey: therfore the Grecians do terme it *ακανθα*,
the Romains *Spina*,) but also other Processes, which from the sides of them are pro-
duced, for the cause of more ready, and greater safetie: which nature (moreouer)
excellently willed to serue for the fixed insertion, and due implantation of Mus-
cles. And as the lower bones are the greater, so likewise the Processes of the higher
in degree, are the shortest, and contrariwise: the greatnes of the Vertebres, and
Processes beneath are wonderfull safegardes to *Vena concava*, and *Arteria mag-*
na, in their region resident.

But before I start from this generall description, to talke of their particular
proportions and partes, I esteeme it not improper, to note briefly vnto you the
v. partes wherinto the backe is diuided: whereby you may clearly accompt the
number of the Vertebres, both proper, and improper. These are the v. the
Pecke, the Brest, the Loynes, *Os Sacrum*, and *Cocci*. In the Pecke first are
vij. in the Brest xij. to the Loynes appertaine 5. to *Os Sacrum* vij. the last 4. are
of *Cocci*: so that by computation of all the rehearsed together, they amount to the
number of xxxij. But vnderstand, that only xxxij. of them are proper Vertebres:
by whose vertues the body is turned diuers wayes, and their ende is (as I sayd
before) at *Os Sacrum*. And those that are appertinent, or depend vpon *Os Sacrum*,
are rather for the similitude, and likenes of Vertebres, numbred amongst them,
then for any office, or use that they reteyne like Vertebres: for those in deede are
right called Vertebres, that with one kynde of Articulation are together compoun-
ded: which is called *Arthrodia*: where as the other (therfore not proper) are di-
uited per *Symphysim*: as most clearly we will endeuer henceforth to handle.

First of all we will (as order requireth) begyn at the Pecke, which is called in
Greece *αχιλιν και τραχυλος*. Which was stretched, and elongated from the body
for the cause of *Aspera Arteria*, as Galen proueth: saying further, that the Pecke
alway perisheth with the Lungen: wherfore euery fith that wanteth the Lungen
is also destitute of a Pecke: and contrariwise, such as haue Lungen haue also a
Pecke: and both haue inspiration and expiration, by the rough Arterie. Wherfore
also efflation, which is the immediate matter of voyce, is the action of the same
Arterie: without the which, voyce could not be made: and the upper end of which
(beyng of the Latins called *Laringa* or *Larynx*) is the chief, and most principall
fournier of voyce. Wherfore it hauyng such affinitie with the Lungen, and ser-
uyng to so notable use, it is euident that the Pecke was furnished for the cause
thereof: and (goyng further) he sayth also playnly, that such creatures as want
their Peckes are domme and mute. And Aristotle sayth euery creature that wa-
teth Lungen wanteth a Pecke. Then fith reason leadeth vs, that the head is di-
staunted from the body so much in man, for the cause of *Aspera Arteria*, and
voyce, and that the erection of the same Pecke could not be made firme and sted-
fast, without the supportable ground and frameworke of Bones, neither moua-
ble, had the same bene of such solid continuitie, as should haue resisted the meane
of motion, which nature therfore construed of sundrie Vertebres, you shall heare
what space is to be vnderstanded by the name of Pecke, and what bones apper-
taine to the construction thereof.

The Pecke is all the part stretched forth betwene the Head and Shoulders,
that is, from the foundation of the Scull to the toppe of the Brest: which in that
space containeth the number of vij. Vertebres, or turning Joyntes, eche one di-
uers, and different from another: that is, the first from the second, and those a-
gayne differing from all that folow: but the iij, that are from the second vnto the
the seventh, are aboue all the rest most likely figured and the seventh it selfe di-
stinct from all other, as shall appeare. But first is to be noted, that the Pecke
was

was not onely ordained to the end to beare, and susteine the Head, but most especially to be auayleable to the diuerse actions, & mouynges therof: which kyndes are not all proper, nor all common: but some motions properly appertayning to the Head, and others common, which are obtayned by the mouynges of the *Pecke*: wherefore *Collumbus* sayth, we iudge the proper mouyng of the *Pecke* to be common to the Head: sozasmuch as the *Pecke* cannot moue, without the stryking of the Head. *Galen* assigneth to the Head two peculiar motions: one is by the mouyng of the Head forwarde and backward, and the other by turnyng it round to the sides: which may be done, the *Pecke* remayning quyet, or not labouryng: but when the Head is greatly moued, downward, or vpiward, or vehemently inclined to the shoulders, such cannot be the proper motions of the Head: seing that they are done by the labour of the whole *Pecke*, or otherwise cannot be. Wherefore the proper motions of the Head are brought to passe, by the meanes of the first & second Vertebre: which is of all others, are most especially Colligate, & bound to the Head: for fro many partes of *Occiput* floweth Ligamentes: which is the cause, that in Children the same is construct of many bones, and therfore hath many riftes, whence they are in the beginning produced: but tyme weareth them so farre forth of sight, as not onely one cannot be discerned, but also euery one acknowledgeth it a bone, without distinction. After this sort it is to be gathered, the Ligamentes are in *Occiput* engendred: that is to say, in diuerse places: & so by the annexed to the first & second Vertebres, then consequently to the *Pecke*: as neither this way, nor that way, the head may sodainly or vnadvisedly slippe.

And to make you more clearly conceiue in your mynde, the exquisite maner of motions of the head, I will let you vnderstand, in what sort *Occiput* is Articulate vnto the first Vertebres, as thus. In that part of *Occiput*, wherein nature hath insculped the large and ample hole for the descense (as is sayd) of the Spinall marey, there are towardes the Anterior part therof, ij. Processe, or outgoyng portions, that is to say, on each side of the hole one: which are receiued in by the proper cavitie of the first Vertebre, made in the vpper part & middle seate of the ascendent Processe thereof, by meanes of which Articulation, the Head is now inclined, and now reclined. From the middle of the second Vertebre riseth a certayne round and long Processe, indifferently thicke, called in *Greece* *ὀδοντοδ*, and *ὀδοντα*, and for the figure and shape therof, likened to the kynde of tooth in mā called the dogge tooth: this is likewise receiued into the cavitie of the first Vertebre, provided on that side also for the same purpose, excluded larger from the side of the common hole, whereby the marey is sayd to descend: and because the whole body of the sayd Vertebre, for the large compasse that by this meanes it is hollowed, should not be wholly priuated, nor the passage for the Spinall marey marred. In the same place (therefore) nature hath in such wise lapped, and fastened to the tooth a solid Ligament, as that the commyng downe of the marey can neither be broken, nor in mouyng compressed: and yet the Articulation not left to strapte, but slacke inough: as it behoued, for the turnyng of the head on eche side: which is thus brought to passe by the Dentall Processe of the second Vertebre, wheruppon the first easely turneth.

By this it is euident, which are the proper, and which are the common motions of the head: and how with the one, the other are made also: although to their mouyng, the coniunction of the Vertebres with the head is necessarie. Wherein *Galen* is much reprehended, for attributyng the inclination, and reclinacion of the head, to the cause of the second Vertebres mouyng, and of the dentiformed Processe: so the side way turnyng to be brought to passe by the first Vertebres Articulation with the head: but that is not so sayth *Collumbus*: for the first ioynt maketh the noddying vp and downe of the head, and the second the circumaction to

E.ij.

ethe

The necke hath motions proper and common. Lib. 1. Cap. 15. The necke can not moue without the stryking of the head. Two motions peculiar to the head.

How greater motions are not peculiar to the head.

By what meanes the proper motions of the head are made.

Why *Occiput* in children is made of many partes.

The head is most firmly tyed to the necke.

How *Occiput* is knitte to the two first Vertebres. How happeneth the inclination and reclinacion of the head.

What is the processe called *Odontoides*.

The description of the Articulation of the second Vertebre with the first. The industrie of nature.

The Ligament of the Processe called a tooth, and the use therof.

How the circumduction of the head is brought to passe by the articulation of the second with the first Vertebre.

Gal. Lib. VI. part. 23

Galen falsly supposed the inclination of the head to be by the composition and huiusmodi together of the first with the second Vertebre.

That the head is not circumducted by the articulation of the head with the first Vertebre against *Galen*.

The first Booke of the

How the first Vertebra turneth by
pon the second as
the hooke upon
the hinge of the
doore.
Galen left bare
without al excuse
Vesalius invented
the right vse of
the Dentall Pro-
cesse to his perpe-
tual payse.

each side: for els should the Dentall Processe be depriued of his right office & fun-
ction: which onely nature ordained for the turning of the head, no other wise, the
as the hooke or hinge of a doore serueth aptly to the opening thereof: and in this,
he excuseth Galen no manner of way, but barely blameth him, as in *hac re parum
diligens*: and *Vesalius* no lesse taketh part agaynst him, opening the window of
light, on the clearer side, prospecting the Sunne, as manifestly appeareth by that
is gone before.

Now it followeth to describe orderly and particularly the Vertebres of the
Necke, since thus much is sayd of the motions of the head.

The first Vertebre therfore of the necke is more solid, and thicke, then all the
bones els of the backe: longwise (notwithstanding) more slender, and differing
very much in forme from the rest, and not hauing any superiour Processe. In
the Anterior part thereof, where the body of the Vertebre should be, that is to
say, the engrossed part, the side is very thinne, by meanes of the hollow excaved
therein for the passage of the Spinall marey. But the outer side of the same part
towards the throat Protuberating, and swelling forth, purchaseth as much firme
thicknes, by the round compassing thereof, as it was made thinner and weaker,
by the engrauing on the inside of the aforesayd cauitie: which receiue the tooth
aforesayd produced from the body of the second Vertebre, which is tipped, or hea-
ded with a rusty Cartilage: to which (for Articulation sake) the like is to be ob-
serued in all other Vertebres. Besides this by diligent Annotatio, you shall finde
euery Vertebre enueld with Processe, both ascendent, and descendent. But
in the first they are excaved, and hollowed on each side, aloft, as the Processe of
Occiput are prominent, to meete and ioyne with them, and beneth to admitte the
upper Processe of the second Vertebre. So that as it seemeth, the upper tur-
nyng Ioynt altogether receiue the insertion, both of the superiour, and inferi-
our Bones thereto appoyzimate. From the sides likewise of the first Vertebre
are stretched two Processe, long, and Perforated, turnyng forwarde, and grea-
ter then are found in other, with larger holes for the transiurie of the Veyne, and
Arterie vnto the Scull: deriuyng braunches from themselves, to the refreshing
of the Spinall marey. There are certaine holes grauen out of either side of the
Vertebres, towards the fore face of them (the first Vertebre onely excepted, for
which therein you must looke in the hinder part) the which holes, or perforations,
as they are grauen through the body of the Vertebre from the hole ordained for
the Spinall marey, so doe the hindermost ascendent Processe giue them place:
which goyng forwarde forthwith by their sides, directly aspectyng the laterall
Processe, haue through them flowyng the distinct number of coniugated Nerves
from the same Spinall marey produced: where these ioyntes are together com-
mitted, you shall finde them in such order incised and cut, as that one participa-
teth or letteth in of the substance of another mutually: saue that I say the first
Vertebre is notable from all the rest, admittynge onely, but not admitted of any.
The holes therfore of the first and betwene the first and second ioynte, repre-
senteth the forme of a long hollow chinke, and no holes: but in all others excu-
ped out one each side round: saue those in the Vertebres of the breast: which are ex-
caved in lengthwise. To speake briefly therfore, out of the upper holes of the
first Vertebre the first payze of Sinewes is brought, and out of the neithermost
(which are also common to the second Vertebres,) both go the second coniugatio
& so out of others other payzes, accordyng to their number, and placynge. And not
onely Nerves, but also the braunches of Veines, and Arteries, haue entrance in,
and out, among these passages and holes, both to the nourishment of the Spinall
marey, and the bones of the Vertebres.

The second turnyng ioynt (beside the tooth that riseth in the middest thereof to
be

1.
The bodie of the
Vertebre is the
copulent and
grosse parte ther-
of.

The descriptio of
the Anterior part
of the first Verte-
bre.

The vse of the
swelled or boun-
ched parte of the
first Vertebre.

The vse of the ca-
uitie of the first
Vertebre.

Euery Vertebre
hath processe
both ascendent
and descendent.

Why the processe
of the first Ver-
tebre are excaved
on both sides.

The first Ver-
tebre receiue one
both sides but is
of no bone secret-
ed.

The laterall pro-
cesse of the first
Vertebre.

The vse of the
hole in the laterall pro-
cesse.

The holes in the
sides of the Ver-
tebres.

The vse of the
holes on the sides
of the Vertebres.

How almost all
the Vertebres of
the backe are in-
cised or cut where
they are committed
together.

The difference of
the first & second
vertebres cauitie
from the others.

Of what fashion
are the cauities
betwene the Ver-
tebres of the backe.

The vse of the
cauities of the Ver-
tebres where they
are committed
together.

be Articulate to *Occiput*: as is sayd before) hath furthermore a body, and a Processie insigned in the hinder part thereof, far vnlike all others of the necke, and the body thereof stretcheth further backwards: from whose posterioir Processie springeth ij. Muscles, which to *Occiput* are also inserted therfore nature willed, that the first Vertebre should haue no Processie in the hinder part thereof, for offendyng the rising of the sayd Muscles. Wherconer the same posterioir Processie of the second Vertebre is clouen: or biforked, as are the other hinder Processies of the ioyntes of the necke, the fitter for the knittynge to of the sayd Muscles. To speake of the spoe, or laterall Processies of the second Vertebre, we haue to note them not onely shorter by farre, then those of the first Vertebre, but likewise scantily so long as the others of the necke, neither altogether so much forwardly tending: which maketh their holes obliquely perforated, & not directly downwardes as the rest. Further note, that the ascendent, and descendent Processies of these Vertebres, are naturally coarticulate and knit together: and that in the most of them, after one sorte and order: that is, from the second Vertebre downwardes: and the second it selfe also hath descendent Processies, not much vnlike the rest: the descendent therfore (as it were) cut obliquely forwardes, & some deale therewith hollowed, do mete with the ascendent cut obliquely or slopwise backwardes, beyng likewise a litle for the aforesayd hollowes swelled: but neither the hollownes of the one, nor the head of the other are (for their obscuritie) to be so termed playnly. But by the way, you must vnderstand their metyng to be made more exactly strong, by the goyng betwene of a Cartilage, crustely coueryng either side: so that, besides their bodies, they are vnited by their Processies also. Beare vnto these Processies are the places of those holes before mentioned, prepared for the production of Nerues, and the entraunce of Veines and Arteries: & if you enquire, how many Vertebres of the necke haue ascendent and descendent Processies, I witnesse vnto you foure: & one descendent: that is to say more playnly, the v. last Vertebres haue both such as ascend, and also such as descend: but the first hath neither: the second onely the descendent: but not one vpperward tending, as the rest: for that could not be permitted, but by corruptyng the Circular mouyng of the head. Euery turnyng ioynt hath his body, besides the first & vppermost, which hath onely a light compassyng proportion, beyng sharpe belied towardes the forepartes, to supply (as before) the losse of his substance inwardly: the rest haue manifestly their bodies in length extended, with a certaine kinde of flatnes in the foreface of them, not improuidently obtained, for the nere lyng to of *Esophagus*, and *Trachea Arteria*: the one of which endeth at the Vertricles, the other in the Lunges. So in committynge together the bodies of them, nature hath done otherwise then in the rest: for euery the neither part of the higher bone, stoppeth forwardes, and is receiued into the hollow of the vpper part of the next bone: the which hollowes as they are large so haue they on eche side as it were bankes, which I presume to compare for their likenes to a sided stole or chayre: or not very obscurely to the seate of a trunke saddle. The bodies of the other sixe Vertebres (for the first in this case is exempted) haue at either end Appēdances, betwene which, thicke and soft Cartilages haue recourse, to giue vnto them more freely, the gift of easie flexion, and turnyng. Agayne, onely foure of them (therfore here the first and second are excepted) haue this fashion proper to them selues, that is, that their laterall Processies are as it were clouen, or me thinke more properly guttured at their endes like a spoute, and not biforked or clouen fully lyke the posterioir Processies: the which places are left for the implantation of Muscles. Directly towardes these, aspect the holes (so oft named) for the production of Sinewes: which are not in single sorte exculped in euery Vertebre, but come forth at the metyng of them, and wast the substance of both, but not alike:

The description of the second Vertebre.

The use of the posterioir Processie of the second Vertebre.

Why the first Vertebre hath posterioir Processie.

Why the posterioir Processie of the second Vertebre is forked.

The description of the laterall Processies of the second Vertebre.

The laterall Processies of the second Vertebre are shorter and with an oblique hole.

How the ascendent & descendent Processies are knitt together.

Descendent Processies.

Ascendent Processies.

The Processies are vnited by the metyng of a Cartilage.

The cauities made to the going out of Arteries are neare to the Processies.

How many Vertebres of the necke haue ascendent & descendent Processies.

Wherfor the second Vertebre hath not the ascendent Processie.

Euery Vertebre besyde the first hath his body.

How nature delt with the first Vertebre wanting a body.

The figure of the bodies of the Vertebres in the necke.

Why the bodies of the Vertebres are flat on the myde.

The bodies of the Vertebres of the necke committed together otherwise then the rest.

What the vpper part of the bodies of the Vertebres of the necke is compared vnto.

All the Vertebres of the necke the first excepted haue Appēdances.

The first Booke of the

for they are deeper engrauen: in the vpper part of the lower bone, then in the inferior part of the higher bone: whiche vnto the diligent beholders, is easie to be discerned.

Where I haue spoken generally of the Vertebres, I haue not there left untouched, those iij. betwene the second, and the seventh: which (as I sayd in the beginning) are most like one an other.

Wherefore passing them, we finde the seventh, (which is the last of the necke) finitimate, and next adioynning to the Vertebres of the brest: and that so, as it seemeth to participate much with the nature of them: and therefore from the superior Vertebres playnly differeth: for the posterior Proccelles of the foure aboue it, are clouen, as is also sayd, but this is whole as I haue found yet Col. sayth it is most commonly otherwise. Besides this, the inferior part of the body therof that meteth with the first Vertebre of the brest, extendeth not downwarde so obliquely as the rest, but meteth with the toppe of the next body somewhat with more flat: and equall playnesse. And thus much as touching the turning ioyntes of the Necke.

That part of the backe which constituteth the brest, beyng that which in dede the common sorte of people call the backe, for the most part consisteth of xij. Vertebres, or turning ioyntes: to euery of the whiche, two ribbes are knit: that is to say on eche side one. So that the number of them is xxiiij. though sometime one is found wantyng, or aboundyng: but that seldome, yet more often aboundyng, then wantyng.

These of the brest do differre from the Vertebres of the necke in largenes, although the others excede them in thiknes, and soliditie of substance: and thier largenes was couenient: for it behoued the vppermost susteined, to beare a lesse scope then the vppermost sustenting. But this marke, that those that are augmented with larger copasse, are so much the more of light and hollow substance: yet accept not this for all the difference betwene them, for besides they are different both in figure, and situation from those of the necke: that is, they are neither so flatte (yet I thinke good if you will to except the two first of the brest) nor yet so oppressed as those we haue spoken of (without it be the vppermost whiche is most of all other like the seventh of the necke) but doe protuberate round, and swell inwardly in the middelt. Also the bodies of these aboue, and beneath, are playne, possessyng ech one a thicke crust of Cartilage, interiect and put betwene them. Neither is their posterior Proccelles (as those of the necke) clouen, nor yet their extremities broad, or round: but long and sharpe, after the maner of a foure squared pillar, or auncient monument called *Pyramis*: whiche beyng broad beneath, is squared vp to the toppe sharpest.

Neither are the transuerse Proccelles biforked or guttured, but long, and great, endyng with round and thicke heades: whiche rising also from the sides of the Vertebres, do erect their ererture vpwordes, but towardes their heads are reclined downward: ther inner sydes being hollowed: that is to say, hauyng proper cauities to receiue y^e heades of the ribbes, are so ordained for the cause of such Articulation. And those cauities are in the neither region of the first three but in the vpper region of the last three, the middle iij. admitte them in the middelt. Contrariwise, the transuerse Proccelles of the xi. and xij. are not like: for to them (comprehendyng but the false ribbes) such strong alligation, as is vnto the rest, was nothing so needefull. Wherefore the false ribbes are committed to the bodies of the Vertebres, as ready allway to giue scope to the guttes, but with a meane, and single Articulation. All the rest are knit with most strong Ligamentes: and yet more, (to the ende that their tyng might be more firme, and steadfast) in the bodies of the Spondilles or eche side, or cauities, or hollowes, wrought

7.
The vij. of the neck ioyntes to the first Vertebre of the brest & reacheth it much. The posterior Proccelle of the vij. Vertebre is not alway solid. The meeting of the vij. with the first Vertebre of the brest.

What part the common people mosse call y^e back. The number of the Vertebres of the brest.

Whereto are the ribbes fastened. The number of the ribbes.

That sometime in the number of ribbes one may be aboundyng or one wantyng.

Of the difference betwene the Vertebres of the neck and y^e Vertebres of the brest.

Why the Vertebres of the brest are broader then of the necke.

The bodies of the Vertebres by how much the greater by so much the more fungie and light. The figure of the bodies of the Vertebres of the brest.

The bodies of the Vertebres of the brest playne. What kind ones are the posterior Proccelles of the Vertebres of the brest, and wherto they are copared. The transuerse Proccelles of the brest are not forked.

Where be the cauities wherin the protuberated heads of the ribbes are settled.

wrought (although not all after a manner nor lyke situation) to admit into them the litle heades of the same ribbes. But their differences in this respect be these: For the first, eleventh, and twelfth haue canities exculped in the substance, and middest of their bodies, whereas to all the rest, they are comon to the extremities, and enter partes of them nere to the holes prepared for the Sinewes production.

As touching the substance of the Vertebres, note, that the lowest and greatest (as is sayd) are rarest and most spongie aboue the rest, which in these of the best is euident: so that sufficient playnly, they are in that poynt, fro those of the necke distinguished: Furthermore the posterioir Processeles (which throughout longitude of the backe procedyng, are called the Spine) of the two last Spondilles are not (as the rest) so sharpe, neither yet so long, nor slender, but broader, and rounder ended: and as they differ from their mates of the best, so are they vnlike (also) those of the Vertebres of the loynes: constituted in the same rolve and order: but most vnlike all others of the backe, both aboue and beneth, is the lowest of the thre, beyng the xij. and last in nuber of the best: which is shortest of others, and neither vpiwardes nor downwardes tendyng, but directly put forth.

Here now we are not to pretermitt so notable a matter, as is yet to be spoken of by the xij. Vertebre, which Galen describeth for the tenth: though more truly in Dogges and Apes, in whiche creatures the tenth in the middest of the Vertebres of the backe, & as the poynt of Arletree: which wholly resting, all others one ech side moue, which thing shall truly be proued in the xij. Vertebre of man, which purchaceth one ether side an equall kinde of Articulation: that is, both aboue & beneth it hath Processeles putting forth, & it might be on both sides receiued, iust contrary to the first Vertebre of the necke, which (as we haue spokē before) on both sides receiue. But if any man, of the varietie of this Articulation more diligētly enquire the reason, let him consider, how that in the superioir Vertebres one kinde of motion is obserued: but in those beneth the xij. a contrary. Wherefore a contrary manner also of articulation in respect of the inferioir, is to be sene in the superioir Processeles. And peraduenture sayth *Collubus* (but oh how excellētly was that noted) the Articulation of the preceident Vertebres is most apt to bow the backe towardes the Anterior partes: whilst the same agayne almost with the whole body, crockyng to the posterioir partes, that giste is purchaced from the Vertebres of the Loynes.

Lastly these Spōdils are, all by ascēdent & descēdent Processeles comitted & knit together: being obliquely cut, & intercrusted with Cartilages. The Vertebres of the necke after *Gal. 13. V. part.* haue xj. Processeles of produced portions: which are so in deede, if you accept the laterall Processeles double, which before I haue affirmed not to be thorough out clouē, but rather made like a spoute, or gutter of lead, which from betwene y. houses conueyeth the water readely: or els but it, as y. ascendently proportionēt in the vpper part on ech side of their bodies, by whose meanes (as I haue before compared the) the neither part of the superioir sitteth in the vpper part of the inferioir, like as in a sided stocle: y. ascendentes, and y. descendentes, y. transuerse or laterals, & one backwardes, beyng the spine or ridge: which reckon more worthy (if the transuerse Processeles be nūbered two a pēce) to be double accounted: especially the fourth middlemost: whose endes are alwayes biforked, and deuided.

But the produced partes of the pccozall Spondilles, *Vesalius* witnesseth to be v. in euery one: as two transuerse, two ascendentes, two descendentes and the spine, or posterioir Processele.

Onely the xij. of the best (in such bodies as it is founde as it were confused as I not seldom haue inuented) hath the transuerse Processeles deuided, the one declinyng downwardes, and the other reclinyng vpiwardes: after the same sort as hath the Spondile followyng, though not so large. Which is appertinent vnto the Loynes, which now we will speake of, whose turnyng Joyntes we accept in

What canities haue the first 11. & 12. Vertebres.

The substance of the Vertebres.

What kind ones are the posterioir Processeles of the Vertebres of the best.

The 11. and last of the Vertebres of the best, what kinde a one.

The 11. Vertebre to be the middle of the Vertebres of the back in the body of man.

The use & figure of the 11. Vertebre.

The 12. Vertebre is on both sides receiued.

The first Vertebre on both sides receiue.

Why one manner of articulation is not to all the Vertebres of the back.

How the back is bowed forward.

By what meanes the backe is crooked towardes the hinder partes.

How by Spondils both ascendent and descendent the Vertebres do also moue.

The number of the Processeles to the Vertebres of the necke.

How they may be nūbered nine.

The iij. middlemost Vertebre seemeth more worthy then the laterall to be accounted double.

The number of the Processeles to the Vertebres of the best.

The transuerse Processele of the 11. Vertebre appeareth in somme as though the head thereof were deuided with some biggous conuol.

Of the v. turnyng ioyntes of the Loynes.

The first Booke of the

Of what substance are the Vertebres of the Loynes.

The superior and inferior Processes what kinde of ones to the loynes.

The Vertebres of the loynes are ioyned contrarie to y other because of their contrarie moouing.

The transuerse Processes.

The first and fift Vertebre of the Loynes.

How their transuerse Processes differ.

Vesalius charged with error as touching middle Processes.

A meane if Vesalius should be deemed in such a matter.

The author in this point neuer found it contrarie to Vesalius.

It is no thanks to me to commend Vesalius his inestimable labours.

The vse of y transuerse Processes of the Loynes.

Why ribbes were not erected ouer the region of the belly as ouer the breast.

Two Processes which Vesalius knew not.

Of what kinde be the posterior Processes of the Loynes.

The Vertebres of the Loynes haue Appendances.

What Cartilage is betwene y Appendances of the Loynes.

The vses of their holes before the inferior and superior Productions.

The differences of the holes of y Vertebres of the Loynes from the others.

Col. Lib. Cap. 17.

A thing common to all the Vertebres the first of the necke onely excepted.

number, five: greater then all we haue hetherto described, but most in substance puffed, and of lesse soliditie: the vpper Processes of these comprehed the caviities, whereunto the extremities of the neither, somewhat for the purpose eminent, to enter: which order is in contrary sort to the Vertebres before declared. The transuerse productions of these, as we finde them much longer then the other of the best, so, lesse thicke, and more vnlke in them selues: for the first and v. hath the shorter then all the middlemost els: and the contrarietie they shewe in their selues is after this maner: the vppermost Processes downwardes bendyng, but the lower vpiwardes, and the middlemost in meane betwixt both: that is, neither vpiward, nor downward. Wherein he chalengeth boldly *Vesalius*, whereat I may well wonder, if so famous and approued Anathomist as he, should in a case so easie, be found, either tryed, to haue no iudgemēt, or els that he would wilfully set downe that he saue not. But with greater admiration I stand amazed at *Collombus*, who without all maner of indifferent excusation coateth *Vesalius*, whilst I haue most beholden, & haue yet in my house Sceletons, by whose transuerse Processes of the Loynes *Vesalius* assertions is verified. Notwithstanding that, I am not ignorant what diuersitie may be found in diuers, and that (I confesse) this is no great point to dispute vpon, but in the way of discourse: to dissolue the contrarietie of Authors. Chiefly I write thus much for the excuse of *Vesalius*, because he is so apertly repproued: as though so learned a labourer in the Arte of dissecting, should haue by negligence set downe that, which diligence neuer inuēted: which might not be so much, as thought of so princely Anathomist.

Now is it to be noted, that such length in y Processes transuerse of the Loynes, was ordained to be as propugnacles (in stead of litle ribbes) to the great vessell, or spoutes, deriued from the fountaines of life and naturall beyng: and not to be produced after the iust length, and magnitude of the ribbes: for their extension ouer the region of the belly had not bene conuenient, neither would haue giuen place to the labour of the Muscles, in making compression for the expelling of excrementes: but in women least of all expedient, as in the tyme of naturall procreation, reason ratifieth. It was sufficient therfore, that the production of the laterall Processes of the Loynes was such, as might only giue defence to the great Arterie, and hollow Veyne. Here vnto these Processes, & not farre from the holes of the Perues, ariseth on ech side one other produced portion, though farre shorter then the rest. Therfore in some bodies not easely discerned: whiche was the cause that *Vesalius* neuer inuēted them. Moreouer the posterior Processes of the Vertebres of the Loynes are neither so long and sharpe, nor so much declining downwardes, as the superior Vertebres before decessed, but (though not in rising so large) yet in proceeding broader, throughout their length stronger, & their extremities compassed in circular sorte. Also these Vertebres of the Loynes haue Appendances, like vnto the rest, but onely as they surmount in quantitie, that is in magnitude aboue the rest, so the soft Cartilage intersited betwene their bodies, is so much the greater and thicker: their holes likewise, exculped before the superior and inferior productions, giue entrance, aswel to the nutrimentall vesselles, as to the transporters of sense produced from the Spinall marey. Notwithstanding we finde not these holes so round as there superiours, nor more largely creaued in the vpper side of the inferior Vertebre then in the lower part of the superior Spondill, but much larger then the holes of the best and necke as their bodies we haue sayd before are larger.

Onely this is common to all the Vertebres, (the first of the necke excepted) that in the hinder part of the body of euery Vertebre (though in the Anterior syde way, of the concanitie for the marey) appeareth the holes ordained for the exiture of the Perues, and ingresse of the vessells of nourishment. Finally Col-

lumbus

humbur noteth this as a generall rule in all bodies, that the posterour p^{ro}cesses of the Vertebres (which rowe is called the Spine) from the second of the Pectic, to the last of the Loynes, are all tending downeward. Whiche assertion I could neuer (in those bodies that I haue seene, or willingly dissected) finde occasion to subscribe vnto: but alway either the vj. of the best, or els some of the Vertebres of the Loynes, did tend either vpiward, though very obscurely, or els directly straight, I meane neither vpiwardes, nor downewardes. But to say truth, you shal finde but small certaintie in the forme of the Processes. The number of the Processes appertaining to the Spondilles of the Loynes are 9. that is to say, to euerie one y. transuerse, y. sided by the sides of the holes and nere to the transverse (though obscured, seene in some) y. ascendents, y. descendents, & lastly the Spine. Now it remaineth to speake of the two last partes or diuisions of the backe, called by the Grekes *ισχίον*, and *κόκκυγας*: and of the Latins *Sacrum*, and *Coccyx*. The which *Sacrum*, being the higher diuision, and beginning at the lower end of the afore described Spondilles, for the breadth and largenes therof, is sometime called *πλατὺν*. Wherein playnly it excellith all other Vertebres: being vnto them as an ample seate and foundation. There are some, that let not to affirme the cause why this same bone was called *Sacrum*, to be this, for that (say they) in women it is endewd with a speciall gift aboue all others: in yelding on ech side from *Os Illium* in tyme of bringyng forth Child, and agayne forthwith closing, by the secret deuise & vnknown Arte of Nature: without the helpe of any Muscile: but as it seemeth to me nothyng at all agreying with truth, so *Gal. Vesalius*, *Columbus*, & *Fuchsius* accompt it a fantastical fiction, & a feyned tale, without the ground of reason, and quite beside the authoritie of y^e truth: for those kinde of persons do interpret this word *Sacrum*, holy: But as *Realdu* affirmeth *ισχίον* to be interpreted *Sacrum*, so likewise *Leonardus* with like learned probabilitie, teacheth vs (in this sence) to take and vnderstand *Sacrum* for *Magnum*, that is, great: as *Homer* in some places, writing *Sacrum Mare*, and *Sacrum Piscem*, for *Magnum Mare*, and *Magnum Piscem*, hath left vs for true testimony. And *Virgil*. (for a Latin Authour) hath *Sacrum auri famem*, for *Magnum auri cupiditatem*. *Galen* ascribeth to *Os sacrum* xij. bones, which the later Anatomistes flatly deny: allowing his description therein to retaine and smatche of veritie, saue onely in Lyons, Dogges, and Apes, but it consisteth of v. bones, and commonly of vij. say they; which in young and tender peares (in dede same lose and separated, as it were not much differing from the other Vertebres: though afterwarde they so knit and cleave together, as that they seme all to make but one bone: were it not, that in their foze partes we finde (as it were) the traces of Commissures. They are together committed like vnto the superiour Vertebres, save that (like vnto the rest) they lacke the interiector of Castilages, because their mouing was lesse needfull. Neither are accompted among the number of Vertebres for any other cause, then that (after a certayn maner) they shew a similitude of the Spondilles: for of motion (whereby they should chiefly be like them) they are altogether frustrate. It is concluded therefore, that nature ordained this bone, not onely for the vpper partes to rest vpon, and stay them selues, but likewise that the inferiour bones might thereto ioyntly (one after another) be tyed, as fro their beginning: and (as it was) a decree from the law of nature, that one principall bone should be made, whereto all the rest should be established: for whiche purpose (this bone being in the midst of the body collocat, and most excellently settled) none seemeth more commodious, nor any so fitte: being to the motions both of the superiour and inferiour partes no lesse then as a ground, or seate assistant. Neither doth *Os sacrum* obscurely reclude, but playne, and largely open and discover the passages on eche syde deseruiant to the transmitting of somewes (as it

v. ij.

behouchth)

That the Spine from the second to the last of the loynes tendeth downward.

The vnter arnes, other of the loynes, resisteth not to giue any man scope. The number of the processes of the loynes.

Os sacrum.

Os Coccyx.

Wherfore *Os Sacrum* is of some called *May*.

How contrary to veritie is the imagination of the ignorant.

The cause why they went about to inuent so feyned a tale: so that onely ignorance appereth the ground of this error.

Loc. Predict.

The Etimologie of *Os sacrum*.

Lib. 1. Cap. 10.

How *Sacrum* in this sence is interpreted great.

Homer.

Virgil.

Gal. Lib. 1. de Off. Cap. 11.

Galen described the *Os sacrum* of beastes.

Col. Fuchsi. Vesal.

Os sacrum in man consisteth of v. or vij. bones.

In young peares *Os sacrum* may be deuised.

Wher the traces of Commissures are obserued in *Os sacrum*.

Why *Os sacrum* hath no Cartilages.

How *Os sacrum* is accompted amongest the number of the Vertebres.

Why they are not trew Vertebres.

The vides of *Os sacrum*.

Why *Os sacrum* should be one.

Why it is situated in the midst of the body.

Os sacrum connecteth Spinal matter and therefore hath holes for transmission of Nerves.

The first Booke of the

The Spinall m^{ar}ey passing thro^{ugh} Os sacrum tasteth of a fine: wye nature.
The nerves from Os sacrum to the haunches and some muscles of the thinges.
How the holes of Os sacrum are made.
The lower & lesser are the holes.
The holes on both sides Os sacrum lesser with one and greater within.
The figure of Os sacrum.
To what use is the hollownes thereof, or the bending of Os sacrum inward.
Where Os ilium is knit to Sacrum and how.
That Os Sacrum and Ilium cannot moue.
The last portion of the back called Coccx.
How the 4. bones of Coccx depend vpon Sacrum.
Why it is called Cauda.
Why it is called Coccx.
The description of the first bone of Coccx.
The description of the last ij. bones of Coccx.
Coccx sometime sheweth bys motion.
Whilist Coccx is bowed the woman is panged.
The processes of the first bone of Coccx.
Coccx containeth not of the Spinall m^{ar}ey.
The substance of Coccx.

The colour of the bones of Coccx.

The bones of Coccx are in children as soft as gristle.

It is much doubted that Gallen neuer dissected the bodye of man.

boned) from the Spinall m^{ar}ey: contained in the concavities hereof, as is serie in other Vertebres. But here, that is beyng in Os sacru, it is of thicke, and like a hard substance, as that it seemeth to tast more of a sinew substance, then of the nature of m^{ar}ey. Wherefore in the end, degeneratyn into many branches of Nerves, goyng backwardes from the borders of Os sacrum, it is strowed diuersly in the haunches, & disseminated amog the Muscles of the thighes as largely is set forth in the History of Nerves: their holes are round excaved, asmuch in the substance of one side, as an other: like as before I sayd of the Vertebres of the Loynes: and the vppermost two greatest, but the further from them the lesser: so likewise behynd (for the holes of Os sacrum do penetrate cleane through the substance thereof, as well as into the concavities of the m^{ar}ey) they are nothing so large as in the inside before. To describe of Os sacrum the fashion, note that vpper part of the body therof is playne, where it meeteth with the v. Vertebre of the Loynes, but on eche side, it stretcheth forth with a great thickness to the meetyn of Os Ilium: and goyng downeward, it tendeth backwardes to the middle Commissure, and so forward agayne; becommynge more narrow, and sharpe, the further from the toppe, descendyn to the end: whereby it is made hollow before, & bouched forth behynd, in which hollow part of it the bowels is notably contained: the posterioir Processes are short, & together committed as the sides. At the sides of the thre vppermost bones of Os sacrum beyng broad, sufficient Solid, and halloved, are affixed and knit the prominent partes of Os Ilium one ech syde, which by the interuenture of Cartilages, and Ligamentes, are so safe connected and bound together, as very hardly they may be deuised. And that which is more, they are somtyme sounde growne together, so that no instrument may disseuer them: which is an euident token, and playne p^{ro}ofe in deede, that neither Os Ilium, nor Sacrum may moue by any meanes.

The fift and last portion of the backe which hertofore we haue nominated, called Coccx, is construed and made of iij. Officles, or litle bones, which dependyn vpon the extremitie and neithermost part of Os sacrum, like a tayle, is therfore of the latter writers (named Os caude: whiche the Grecians call Coccx, because it somuch resemblith the beke of a Cuckowe: being also towarde the end, enermore sharpe and narrower, together with the crookednes. The first bone of Coccx, beyng broader then the rest, hath in the vpper part therof a cavitie, sufficient to receiue the extreme end of Os sacrum and so is coupled with a Cartilage: the other ij. likewise beyng more round, are after such sorte committed together, as that, when need requireth, they might shew a certaine kynde of mouing: which Collumbus affirmeth to bolue (though not without great payne) in womē, at the comynge forth of the byrth. Foure Processes apperteyne to the first bone: as two laterall, or on the sides, and other two behynd, sharpe, and vpwordes reclynng: these bones haue no place within them for the Spinall m^{ar}ey: wherfore neither haue they holes, for the transmission of Sinewes: their substance is hollow and light, like as the Vertebres of the best: their colour is red: and in Children as soft as gristels.

Galen's description of the last two partes seemeth wholly reiected, in notynge thre bones to Os sacrum, and ij. to Os Coccx: so much, that no man beleeueth he euer dissected the body of man: but who is so ignoraunt that knoweth not, how euen in one region, great difference, and sundry alterations in natures shapen are found: since I haue to shew in my house a skeleton, which were the bones sometime of a tall man, whereby I am able to appoyne asmuch (to the admiration of all Anathomistes) as Galen affirmed as touchynge the backe, for whereas the most famous dissectors, and princes of Anathomy, haue bowed fine Vertebres to the Loynes, v. (but most commonly vij.) to Os sacrum, and foure to Os Coccx,

myne

myne hath neither of all those true : but contrarywise, vs. to the Loynes, iiii. to Os sacrum, and onely one to the tablebone. I write not this to the defense of any error, but that ech one, dewly waying the alterations of natures, and nations, should be more studious them selues to write the truth, then greedy to repone, whose actes they neuer saw.

Thus with a sufficient proliptic, we haue entreated of the Vertebres: whiche so; because xij. of them are sayd to constitute the brest (which is the mansion of the heart and spirituall partes, or (as *Fuchsius* sayth) a certayne strong enclosure, so circumscribed and compassed for the safe keeping of the hart and Lungen) it is fitte to describe now in what order.

It seemeth nothyng at all disagreeing to truth (by the Assertions of sundry authors, inferred on this behalfe) that the construction of the brest consisteth of iij. thynges: that is to say, of the Vertebres or Spondils, of the brest bone, & of ribbes. in which creation, the diligence of nature was meruaylous as Galen declareth in his 7. *De Usu part.* in not making it altogether bonnye, or fleshy, but by the mixture of both: for if of bones onely, the brest had bene vtterly destitute of moving: And contrarywise, if of Muscles without bones, it could not be but by contractio, to fall vpon the heart and lungen, haneing nothing to sustaine and hold them by: but by this meanes, both the brest moueth, by the benefite of the Muscles intersited among the bones, and the Muscles are susteyned: also the strength of the bones, which are extended with such ample scope and conueritie, are most expedient for the secure beyng of the heart and Lungen: otherwise all the members must haue yelded to voyce and respiration: which by this meanes, are most notably atchieued, together with competent compasse, and mate room for the magnitude of the heart & lungen: which (as testifieth *Fuchsius*) imitateth the fourme of the brest, but not the brest of the Lungen.

Wherefore, to the constituting of the frame of the brest, as the ribbes are the principall partes, so *Columbus* proueth the aforesayd Vertebres, that is from the last of the necke, to the first of the Loynes, to be of more efficacie to the strength of the brest then the brest bone. For to the (sayth he) the ribbes are coupled (almost all) with double knittynge: and therfore receiue twise somuch strength from the Spondilles, as force from the brest bone: the number of these ribbes are xxiij. that is, on eche side xij. and this we accept for the most part: although (sometime) they may be found more in number, or fewer, as well in men, as women. Wherefore to dispute with the impudencie of such, as will haue the womans side in number of ribbes, to surmount the mans, it should be extreme madnes and follie: for more in number, or fewer, hapneth onely by the abundance or want of the matter of generation: no otherwise then as sometyne we finde more, or lesse then five fingers on a hand. Also we must note, that by the extraordinary number of Vertebres, may growe the like effect in accompt of the ribbes.

But to speake of the number which most commonly we finde: that is to say on either side xij. of the whiche number there be certaine named True and Legitimate ribbes, and others false and counterfeit ribbes: those that are nominated to be the trew and perfect ribbes, are the vppermost vij. because they are vnited, by a Cartilage goyng in the midst to the brest bone by the manner of knittynge called *Arthrodia*, heretofore sufficiently defined: five ribbes following these are the vntrew ribbes, because they are not conioyned in the order of the rest to the brest bone, but are committed onely to the Cartilages of the superiour trew ribbes: the xij. alone by it selfe refuseth to be fastned with the rest, and therfore is stayed and bound to *Septimum transversum*: neither meruaile, if sometime you finde the xj. in that sort colligate to *Diaphragma*.

The ribbes (as I sayd before) are with a double tyeng coarticulate to the

A backe very strange from that whiche is described.

I doe not defend Galen in this, knowing that he hath erred much in the Vertebres, but to giue the signe how vncertain their number is in most bodies. The brest is the mansion of the heart.

Cap. xxiij. lib. 1. The construction of the brest consisteth of three thynges.

Nature in the construction of the brest very wise and prouident. Why the brest was not made all of bone.

Why the brest was not made of muscles without bones.

How best is the right construction of the brest.

If the brest had bene made without bones what discommoditie had hapned.

The lungen imitate the fourme of the brest.

Lib. 1. Cap. 23.

Lib. 1. Cap. 19.

That the brest hath more strength from the Vertebres then from the brest bone.

Almost all the ribbes are double knitt, to the Vertebres.

The number of the ribbes.

The ribbes are not alway 24.

That the man hath as many ribbes as the woman.

The reason why the ribbes are in some more in others fewer.

The number of the ribbes is answerable to the number of the Vertebres of the brest.

The division of the ribbes.

Whiche be the trew ribbes.

Why they are called true ribbes.

The first Booke of the

How the 11. last
are tied.
The Processes of
the ribbes in the
Posterior part.
The cavities in
the spaces of the
Vertebres.
An other Processe
in the ribbe.
The use of this
other Processe.
Whereto this o-
ther Processe is
tied.
What ribbes
want the second
Articulation.
What thing is
common to all
the ribbes.
The Appendan-
tes of the ribbes.
How much space
the ribbe hath of
bonye substance.
Whereto the Car-
tilaginous sub-
stance is produ-
ced fro the ribbe.
The use of the
Cartilages be-
twixt the ribbes
and brest bone.
Of the substance
of the ribbes.
The extremities
of the ribbes.
The middle part.
Towardes the
brest the ribbes
are broader.
To knowe if right
from the left
ribbes.
The ribbes of a
Lyon are not flat
but rounde.
The Cartilages
of 3 true ribbes
are harder the of
the false.
Why the gristles
of 3 true ribbes
are harder.
The harder are
bound to the har-
der partes & con-
trariwise.
The Cartilages
of 3 true ribbes
in old persones
doe participate
with the nature
of bones.
In length the dif-
ference.
The Cartilage of
the last ribbe is
shortest.
Whereto the last
cartilage differeth
from the first.
The first Carti-
lage and ribbe is
broadest.
Why the ribbes
haue such longe
Cartilages.

Vertebres, all saving the 11. last : which be in single sort committed to the Spon-
dilles: The endes of all the ribbes backwardes are prominent, like unto headed
Processes, or productions; rather sharpe, then round: the which heades are immit-
ted into the bodies of the Vertebres: There are also in the sides of them (for the
purpose) certaine cavities, diuersly apparant: for nothing so deeply excaued are
those, of the three neither most ribbes seruing also to their inarticulation: ther-
fore not so firmly knit to the Vertebres. They haue besides this, not farre from
the head, an other Processe, (the space therfore betwixt both is left hollowed) and
this Processe iutting forth like a knot in a peece of wood, is a meane to giue the
ribbe an other stay: for it is fast tyed also, and that with most strong bondes, vnto
the transuerse Processes of the Spondilles.

The which maner of knittynge (notwithstanding) we must not accompt com-
mon to all the ribbes: for the xi. and xij. yea many tymes the first also, are de-
picted of this second Articulation: yet this is comon to all the ribbes: that is, to con-
sist of bonny, and Cartilaginous substance, as also to be endewed with Appen-
dances, as well where they couche with the cavities of the Vertebres, as also are
connected to the transuerse Processes. The whole space of them, from the Verte-
bres, towardes y Anterior partes, is of bonny substance: but the true, in coming
to the brest bone: and the false, to the gristles of the others, yeld forth great store
of Cartilaginous substance: to the end that the softer with the hard, might not
sodainly be compounded.

Howeuer the osse substance of the ribbes is not euery where alike: for the
extremities and endes of them are tender, light, & hollow, but middle part much
harder, and also inwardly medullous: so also, that part, that is herest to the Ver-
tebres, is euery more narrow, and as it were round, in comparison of the other
space nearer to the brest, which on ech side, are made more broad, and flat. *Collum-
bu* distinguisheth the right from the left, by the thickness & thinnes of the partes:
For (sayth he) for certaine note, that the superiour part of euery ribbe, is thicker
then the inferiour: and not onely in man, but likewise in all other creatures (the
Lyon excepted) he alloweth this to sound with truth. Furthermoze the Cartila-
ges, which the ribbes forwardly produce, are diuerse, and not of equall Soliditie
in substance: for those of the true ribbes, are not so soft as the gristles of the false
ribbes, and that for good consideration: for the one is committed to a harder sub-
stance, the other to a more soft: as is manifest in the vppermost of true ribbes,
whose Cartilages are fastned to the brest bone, whereas they of the counterfeite
sort are but tied to the Cartilages of the others. Wherfore, the softer with the sof-
ter, and the harder with the harder partes better to indure, and more safely to
knit, who is so ignorant that doubteth. And that which is more, you shall finde
in very old persons, those superiour Cartilages belonging to the true ribbes,
not as we haue sayde before, but to be into osse substance (that is the nature of
bones) Degenerated, and chaunged.

Amongest the rest, the vi. vii. viii. and ix. Cartilages of the ribbes, are longest,
but those of the false ribbes more slender, and narrower pointed: which is not
so of the true ribbes. Notwithstanding the Cartilage of the last is shortest of all,
like that of the first true ribbe, except in this differing, that whereas that is sharpe
and slender, contrariwise this is ample and broad: no otherwise then as it sur-
ceadeth all others in breadth: and that principally, towardes the part therof that
nearest approacheth the brest bone: and that farre otherwise, then hapneth in all
the rest, whose begynnynge contrariely, are broader then any other portion of
their progresse. Such Cartilages are requisite vnto the ribbes, yea and very need-
full, not onely for the easie motion of the brest, in being extended and compres-
sed in the sleepe, after the naturall motion of the Lungen, but also for the better
safetie

safetie therof, from outward, and extrinsecall annoyance. For by their meanes, eche sodaine percussio, or stroke of the brest hath an easie repulse, in their yeldyng from it: which otherwise might breake the ribbes, or at least deuide them fro the brest bone. But these, occupying the meane space betwixt the ribbes and brest bone, are by expiration inflected, but by inspiration extended. Likewise, the vij. Cartilages of the superiour ribbes are equally distanced, but the compasse of y^e ix. viij. viij. & inferior part onely of the vij. where it respecteth the vij. are diuers, and variable, and their Cartilages so cleaue together, as they might seme continuall: leauyng no space, where to be separated.

Beyond all this, eche Cartilage appertaining to the true ribbes, hath in the end therof, as it were a certaine head, or Tubercle, wherby they are comitted, & ioyntly knit vnto the corners or cauities, exculped in the sides of the brest bone.

To speake of the figure of the ribbes, or what kinde of fashio they haue, no man is ignorant: onely this is to be noted, that y^e semicircled order of the ribbes, and compassed creation of the brest were most expedient, as well for the force and strength therof, as also for the matter containyng of many thynges: and so consequently, for the better safetie of thynges contained.

The first superiours, and last inferiours, beyng farre shorter then the middlemost, to the roundyng and compassing of the brest do not a litle lend (as it were) their helpyng handes. Wherfore the obseruation therof is worthy: since the vppermost are more crooked and bendyng then the neithermost, which are nothyng so bounched outward, nor strapt: the middlemost agayne, beyng more long, and large, are also broader then the rest, except it be the first of all, which as it is shortest, so it is also most broad: whereby we gather, that by the strapt comyng in and bendyng of the vppermost, the lyest part also of the brest is made the narrowest, and straptest of rowe, but agayne further goyng downwardes, where the ribbes are largest, and more at libertie extended, there also the brest must needs haue greater scope, and compasse, as it behoued.

Now agayne because the ribbes, in their inner region or side, are succinged and clothed with a most sensible Membran called *Pleura*, and to the end that, the asperitie and roughnes of the ribbes, might not be at any time, to the sensibillitie of the same, offensauit, it was therfore carefully prouided for, they beyng inwardly, wrought so smooth & easie for the same as may be deuised. There is a certaine hollow, or long cauitie in the lower region of eche ribbe, whiche lyeng after the longitude therof like a gutter, yeldeth way for the course of Veyne, Arterie, and Nerue, therein runnyng together. And this maner interne cauitie is indifferently in all the ribbes, onely stretchyng longer and deeper in the middlemost: but the first & extremest ribbes, admittynge smaller vessels, for the smalnes of the ribbes, haue likewise lesser cauities or gutters, to their substance engraued. Wherfore, for this cause, we are most excellently warned, in the disease called of the *Greekes Empiema*, that in makynge incision for the drawyng away of *Pius*, we be sure to apply our instrument to the vpper region of the ribbe, but not to the neither part therof in any case: for feare of the great incommoditie, that might ensue by deuiding those vessels: which (as appeareth in the lower side of the ribbe) are easie to be touched.

But outwardly the ribbes (I meane in the posterior part of them) are sufficiently rough, and vnequall, for the better fastenyng to of the Ligamentes, wherby they are alligated to the Vertebres, in that order as we haue said before. But not far fro those Tubercles or productions, which we haue nominated to articulate with the transuerse Procelles of the Spondill, the ribbes are endewed with another prominent portion, whereto groweth the longest Muscle of the backe: and not far thence, in a rough part of the ribbes (for so is the whole space of iij. fingers

b. iij.

by eoth

The seruice of the Cartilages in inspiration and expiration.

The spaces of the ribbes. The lying together of the Cartilages.

How the Cartilages of the true ribbes are knit to the brest bone.

Every man knoweth the fashio of the ribbes. To what use the brest was made compassed.

The cause why the vppermost and neithermost ribbes are shorter & the middlemost longer. The vppermost ribbes are more crooked.

What kinde of ones are the middlemost. The first ribbe is shortest and broadest of all others.

Pleura clotheth the ribbes on the inside.

Why the inside of the ribbes is not rough.

A Veyne, Arterie, and Nerue, what cauitie in the ribbes receiue they.

The cauities of the ribbes compared together.

For the disease Empiema how incision must be made. What hurt may ensue by making incision vnder a ribbe.

The ribbes on the outside rough and why.

The insertion of the longest Muscle of the backe.

The first Booke of the

The insertion of
the muscle mo-
ving the breast.

Sternon 1. pectus,
the breast bone.
Sterhos is rather
the region of the
breast.

Of how many
bones Sternon
consisteth in o-
ther creatures.
Galen in error.
The breast bone in
man of what parts
it consisteth.

Lib. 1. Cap. 19.
The description of
the first bone.

The description of
the second bone.
The third bone.
wherefore it is
knit to the breast.

Mucronata Carti-
lago where.

Of the substance
of Sternon.

How the breast
bones are bound
together.

Col. lib. 1. Cap. 20.

The breast bones
are united toge-
ther by Symphysis.

The breast bones
move after the
motion of the
ribs.

The cavity pec-
ting to the defense
of the rough arte-
rye.

The cavities ad-
miring the heads
of the cancell bones.

The toppe of the
breast bone rough
to what end.

At the lower end
of the breast bone
groweth the no-
table Cartilage.

The figure of
this Cartilage.
The names of it.

Why this Carti-
lage cannot defend
the mouth of the
Stomache.

The mouth of the
Ventricle is nea-
rer the backe.

The blow of Mu-
cronata Cartilago.

A wound in Mucro-
nata Cartilagine in-
ferreth death.

breath from the Vertebres) is aptly inserted the vi. Muscle of moving the breast: and thus are the ribbes committed to the Vertebres.

The breastbone, which the Grecians call *στένον*, and *στέος*, but in Latin *Pectus*, is farre otherwise in foure footed beastes, and much alienate from the naturall construction of the same in mankinde: for that in Dogges, Apes, & other such lyke, it consisteth chiefly of vii. bones: which perhaps betwixt Galen to that error, as appeareth in his xiii. chapter of bones: but the breast bone in man is construct and wrought of foure partes, that is to say, of iiii. or iiij. bones: but not so many as are true ribbes on a side: which (I say) in beastes, & not in men, are found. *Vesalius* found but three in aged persons. Whereof the first is very large, and also thicke, but not so thicke as might surmount the largenes, & broader in upper part then where it meeteth with the second. The second (contrariwise) is narrower in the begynnyng then at the lower ende, and exceedeth also more in largenes, then in thickness: but the third is a small bone, and is committed to the inferiour part of the second bone, after the like order as the second is toynd with the first: and is knit there, to the second bone, whereas the Cartilages of the vii. ribbe be Articulate to the lower seate of the same. This bone, as it is large, so is it also slender, and in the lower seate therof degenerateth into a Cartilage, which hath to name by proper appellation from the Latins, *mucronata Cartilago*. The substance of the bones of the breast retayneth no certaine soliditie, but are every where soft, spongie, and hollow, and are bounde together, eche one by the helpe of a Cartilage: the whiche maner of knittynge and Coarticulation, Galen calleth *Synarthrosom*, whose moving is obscure, and as playnly we have discused hertofore: but *Vesalius*, and *Collumbus* do write in steade therof *Symphysis*: which we declared to be destitute of all manner motion, as the breast bones, which (notwithstanding they be committed together with Cartilages,) haue not any moving, but thereby rather bow, and yeeld to the elation and depression of the ribbes. The upper part of the first, is much larger then any part of the rest, and also thicker, hangynge in the middlemost part therof above a hollow manifestly erculped, givynge place to the descension of the rough Arteries. On eche side of the which corner, the substance of the same bone is once agayne ercaved outwardly, and that most excellently, to admitte the Articulation and knittynge of the canell bone on eche side. Both the inner and outer region of the breast bone is indifferent smooth, and even, but the toppe of necessitie hath a certaine roughnes, whence springeth and exurgeth a valiant long Muscle, stretchynge from the toppe of this Pectorall bone, up to the Mammillar Processe on eche side, where it is worthely implanted.

At the lower end therof (as we sayd even now) groweth the Triangular Cartilage, named *Mucronata*, because it is downewardes sharpe poynted, and edged like a sword: wherefore some also call it *Ensiformis*, and *Gladialis*: other, for that it hargeth like a shield, say *Chyrealis*: some agayne, *Malum granatum*: but the Grekes, *Xiphoides*. Whereby some heretofore, haue supposed the mouth of the Ventricle to be chiefly defended, as onely a muniment for that end to haue bene created: wher as it is evident, the mouth of the Ventricle to be thence not a litle distant: & nearer (by farre) situated vnto the backe. Wherefore this accordynge to the opinion of the latter sort, the breast bone was created as a stabiliment vnto the ribbes, which Orbicularly effourme, & fashion the amplitude & largenes of the breast. But *Mucronata Cartilago* (sayth *Realdus*) is principally a propugnacle vnto *Septum transversum*, which in that place is much of sinewye, or tendinous substance, whereby it commeth to passe, that by the vicinitie it hath with *Septum transversum*, and the same *Diaphragma* with *Pericardon* (whiche is the Inuolucure of the hart,) and so consequently with the hart, a wound that penetrateth the same Cartilage, and hurteth the midveine, induceth death, most commonly: as more at large we haue

haue declared other where.

As touchyng the Officle, or litle bone contained within the hart, although it please *Columbus* utterly to disdayne the description thereof and lesse to beleue any such matter, deridng y^e authoritie of Galen somuch in that behalfe: yet as tract of tyme (the naturall nourse experience,) teacheth y^e paynfull Artiste y^e ready way out of the dōzes of darknes: euē so truth (like vnto the flames of fire) be yng neuer so couered & damped for a space, findeth yssue (at length) on one side or other: & so is clearly apparaunt to all beholders. I meane not hereby to repugne altogether y^e doctrine of so woorthy a man, whose knowledge & rare experience (as I ought) so I honour: but rather with such cōiecture as standeth both with experience, & sufficiēt probabilitie to stand forth in the middell. Galen sayth in his viij. *De Vsupartium*, that in the foundation of y^e hart, (about the rootes of *Arteria aorta*: the Arteriall Veines, & of their Membrans,) is found a certaine Officle, which is not playnly a bone, but like a Cartilage: but the greater that the creature is, the more also doth that Cartilage degenerate into Ossie substance. Hereby is signified, that Galen meant not in the hart onely of Man that a bone might be founde, who is nothyng neare the quantitie of such creatures as he dissected for that purpose: & after the inuention thereof (as at Rome he found it in an Elephāt) he forbiddeth vs to call it simply a bone, or an Ossie Cartilage, but a Cartilaginous bone. And notwithstanding that he sought the same in other creatures then man, yet I cannot thinke that he simply ascribed the same vnto the body of Man onely of imagination: But as he sayd as touchyng beastes, the greater they be of bodies, the more also &c. so I vnderstand his meanyng as touchyng men, not so much as their bodies differ in quantitie, but rather thus, y^e elder that the body is (especially after y^e ripenes of yeares) the more manifestly also doth y^e same Cartilage become harder of substance: so that in men full of dayes, & such decrepittes as old age hath long arrested, we may finde (as Galen sayth) this Cartilaginous bone at the rootes and Membrans, of the sayd Arteries, and Arteriall Veyne: as it were a staffe, or stay vnto them and a stabiliment to the whole body of the hart in the debilitie of yeares, and that with great perspicuitie. Doth not *Columbus* himselfe, in his viij. booke entreatyng of the hart and Arteries confesse, that in the place before mentioned doth grow a Cartilaginous substance: Whiche, by his wordes in his xij. chapter of bones, he graunteth to be a firmament and ground to the rootes of the same Arterie, and Arteriall Veyne? And who doubteth but as age taketh away Appendances, driueth out Seames, hydeth Commissures, and in diuers places of the body transfor meth Gristels vnto bones, & soft substance into harder: so likewise this in the hart, degenerateth from the nature of a simple Cartilage, into a Cartilaginous bone. And that I seme not to runne altogether headlōg vpon coniecture, I make it knowne vnto you that the sight of myne owne eyes haue testified, in dissectyng the body of an old Gentleman, of great woorthyp, and famous antiquitie, in *Lincolneshyre*. Anno Do. 1574. Whylest imitatyng the mynde of Galen, I opened y^e least Vētricle of the hart, & searched to the roote of *Aorta*, I easely discovered y^e thyng, wherfore I sought: findyng there the Cartilage fastened to the Mēbrans, of y^e aforesayd vessels, become vptowrdes, playnly of Ossie substance, the length of iij. Barley cornes, & at the neither end gristelly, the lēgth of one: whereto was fastened y^e rootes of the great Arterie, named *Aorta*, & the Arteriall Veyne, with their Membrās. And this Cartilaginous bone I willingly separated frō the body of y^e hart, in opē sight of the woorthypfull, the old Gentleman his aliaūce & frendes, who I suppose haue as yet reserved it.

Thus (gentle Reader) thou hast to determine of the bone in the hart: not that I will haue it found, as generally as other bones, in euery age, but that I would not neglect the description thereof, for thy easier vnderstanding, wheresoeuer thou

I.

shalt

Of the bone in y^e hart.

Opportunitye findeth that some tyme which want of good occasion long tyme before did darken. I purpose not to proue that which shall be found in all ages but that in the last age I suppose it truely for the most part although *Columbus* confesseeth no tyme.

The beginning of the bone in the hart.

Galen nameth the beastes wherin he found this bone. It is not an Ossie cartilage but a cartilaginous bone.

The elder & longer the harder this Cartilage.

The bitt of y^e bone in the hart.

What age beginneth to passe.

A trow exploit in y^e bone of y^e hart.

Where the bone in the hart was found and what kinde of one.

That the Cartilage in many yeares doth degenerate into a bone though some other creatures haue it in all ages.

The first Booke of the

shall happen to inuent the like.

Now it followeth to speake of the shoulder blades, which the Grekes call *ἀμοπλάτυ*, and sometwiles simple *πλάτυ*, but the Latins most commonly *Scapula*, & are two in nūber: that is to say, on ech side one, and are sited towarde the toppe and posterioir region of the brest, being bound also by the interuenture of Muscles, to *Occiput*, to the *Vertebres* of the necke, and brest, and to the bone *Hyoides*: so likewise cleauyng to the uppermost ribbes behynd, do serue as proper propugnacles to defend the backe, and giue strong repulse to all outward injuries offred therto: the whiche part in dede of the backe is more in the way of outward damages, and stroakes then any other: wherefore the shoulder blades are made after a defensiuie fourme, beyng inwardly towarde the ribbes, concaved, and hollow, but outwardly prominent, and puttyng forth a strong ridge, like the rising of a hill, or rocke vnto the superioir part: not a litle to the augmenting of their validitie.

And besides those partes before named, who seeth not how the shoulder blades are most firmly Articulated to the Canell bones, and shoulders, to the *Vertebres* of the brest, necke, *Hyoides*, *Occiput*, ribbes, & their Muscles: wherby in dede appeareth how necessary is their construction, since not onely they defend the hinder partes, but also admitte the insertion, & due growyng and rising of Muscles.

Their fashio is after a Triangular maner, although not equally sided, or squared. For the upper part is a great deale shorter then the other two, which goyng downwardes, do end at an obtused and blunt corner. And this obtused corner, is that part which *Columbus* supposeth most woorthy to be called the seate or foundation of the shoulder blade: Albeit *Vesalius* iudgeth it to be that side of *Scapula*, that reacheth down after the longitude of the backe, next to the Spinnall Proceses of the pectorall *Vertebres*.

But briefly, these bones are endewed with thre notable productions, or Proceses: whereof the first beyng likewise shortest, hath a broad and hollowed head, ordained necessarily to receiue vnto it the toppe of the shoulder, beyng first knit thereto: yet because the compasse of this Processe was not sufficient inough to containe therein a hole agreyng, or correspondent to the greatnes of the head of the shoulder, and because also it was requisite, that the largenes thereof should be such, as might safely comprehend, and keepe the same for ouer lightly rusing out of his place: therfore nature not onely added therto a thicke Cartilage: which coueryng the inner part and sides of the caviities, maketh for it a large and deeper hole, but also beset it excellently with the two other Proceses, as it were on the most perillous partes, and dangerous sides.

One of them compared to a Crowes beke, or anker, is therefore called *Ancyroides*, or *Coracoides*. By this arme is distaunt, and deduced from the ribbes: & this containeth the shoulder bone in his seate, yelding thereto great validitie and force on that part. No lesse maketh it also the insertio of the Muscle, which byaweth the shoulder blade to the Anterior partes, and botweth the cubite.

The other, beyng the last of the thre Proceses, beyng that, we assimuled and likened to the ridge, or rising of a hill, is farre longer, and further prominent then any of the rest. This is it which the Grecians do nominate *ακρομιον*, as it were the poynt and toppe of the shoulder. This Processe (as it were honeryng ouer the toppe of the shoulder) woorthely prohibiteth, that no sodaine Luxation bywardes be committed, but is euer a most safe defence and propugnacle thereto: so that the shoulder is strongly munited and fenced from sodayne decay, by the two last recited Proceses, and no lesse bound vnto his seate by the first. But this, not all the office of the thre: for, besides that it maketh the shoulder eche where more strong and perdurable, it offreth forwarde a place, whereto the Canell bone is aptly knit

The shoulder blades or scaple bones.
The number of scaple bones.
Situation.

Use.

What part of the backe standeth most in the way of hurt.
Foureth.
The spine of the scaple bone.

The scaple bones to the canell bones and shoulders.
The knitting of the canell bones.
The necessitie of their construction.

The scaple bone thre square.

Lib. 1. Cap. 17.
The foundation of the scaple bone.

1.
The Proceses of scaple bone.
The first Processe.

What amplifieth the hole in the first Processe.

The vse of the cartilage in the knitting of the shoulder to the scaple.

The 11. other Proceses, their vse and situation.

2.
The Processe *Ancyroides*.

The insertion of a Muscle to *Ancyroides*.

3.
The Processe *Acromion* why it is so called.

The vse of *Acromion*.

The canell bone is ioyned to *Acromion*.

knit and confirmed. And prepareth a most apt seate for the insertion of Muscles.

These bones are eche where vnequall, and no place foummed lyke an other. For all that space on the vpper side, betwene the broad Processe backwardes by the ridge, to the extreme border, and also beneth the same ridged Processe, betwene to the seate of foundation asforesayd, is very thinne, & vnequally hollowed, but the Processe them selues, & (principally) that part of the bone that is next vnto the arme, sheweth not onely an excellent thicknes, but also the substaunce thereof appeareth medullous and hollow. The inner region thereof hath cauities, that obliquely stretch ouerthwart, made by the often moving of the ribbes, which on the outer side agayne do protuberate and giue forth. And notwithstanding that some partes outwardly, yeld to the inner cauities mentioned, yet neuerthelesse the same side, refuseth not to giue place with like hollownes, to the Muscles which are orderly in them couched: which marueilously argueth the industry of nature, who to the end their substaunce might not thoroughly be decayde, would not eche where, for the insertion of Muscles, or scope of the ribbes, embicill, and wast so much of the bones: but rather outwardes, and inwardes (as such occasion was offered) that they should boiue, and yeld on ech side.

The number of Appendances attributed to these bones are v. that is to say xij. at the inner side, neare to the goyng down of the Spine, which are fastened to the foundation of the shoulder blade: the which place is the original of certaine Muscles. The other ij. portions Appendant, do minister Ligamentes, wherewith the shoulder is bound in his seate or hole, and the Cannell bones fastened to the rehearsed Processe named *Acromion*: that is to say, of these ij. Appendances *Acromion* chalengeth one, and the hollow or seate of the shoulder the other.

Furthermore in the toppe of the shoulder blade, betwene the Processe *Acromion*, and the supreme part of *Scapula*, is a proper rounde cauitie made, that by the Muscle therein sited, might happen the circumaction and round, or wheelyng motion of the shoulder. Much profitable therfore we must accompt this Processe *Acromion*: which both strengthneth the other partes, produceth Appendances, offreth it selfe to the insertion of Muscles, and stayeth in such order the Cannell bones, as that *Columbus* sayth, such creatures as haue not those bones, neither haue they this Processe *Acromion*.

The Canell bones therfore, called in Greeke *κλῆιδες*, in Latin *Furcula*, *Clavicula*, or *Ingula*, which we haue not yet spoken of among the partes of the brest, are certaine bones ioyned on eche side aswell to the brest bone, as the shoulder blade, and thus.

From the cauitie on both sides, of the toppe and vpper part of the brest bone, which we haue before described, departeth the Clauicles or Canell bones (as our common English Phrase is) & beyng ouerthwartly conuayed, do ascēd aboue the top of the shoulder vnto the late recited Processe called *Acromion*: where they shut in, and enclose the shoulder, coarticulate, & knit with *Scapula*, as we haue sayd before, in such order, as that the arme thence by no manner of meanes, may slippe vnto the brest: but there hence holdeth it so stedfastly fast, as greatly anayleth, not onely to the moving of the handes aptly to the brest, but also (as it seemeth) most seruicable to their innumerable actions: which other wise might moue, but at no tyme with such stabilitie, & stedfast certaintie of doying: which is the cause that some haue called them *Furcula*: as it were little proppes, or postes, to susteine the shoulders: some agayne *Clavicula*: as it were the keyes of sure and certaine moving. Others *Ingula*: as they say, for the fashion of yokes by them resembled.

To speake of their substaunce, which is fistulous, and hollow, couered with a thinne bonny crust, you shall finde them most easie to breake, beyng much more round then a ribbe, and also thicker: saue that their hollownes maketh them more

The inequality of the scaple bones in thickness and thinnes.

Where the scaple bones are fugous and medullous. The inner Cauieties of the scaple bone. The cauities on the outside.

The industrie of nature in the outer Cauieties.

Five appendances of the scaple bone.

The vses of the appendances.

The use of the cauitie betwene the processe *Acromion* and the head of the scaple.

How little is the Processe *Acromion*. Such creatures as haue not canell bones doe want the *Acromion* Processe. *Cleides*. i. *Clavicula*. i. the canell bones. The canell bones ioyn to the toppe of the brest.

The description of the canell bones.

Their vses.

Why they are called *Furcula*.

Why they are called *Clavicula*.

Why they are called *Ingula*.

The substaunce of the clauicles. The figure of the clauicles.

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The first Booke of the

ragil l, and brittle: their making is not unlike this figure. S. for twise are the Clauicles crooked, twise bunched out, and twise concaued, or hollowed: from the beginning at *Os pectoris*, vnto the middle region, or halfe of the bone, it is hollow inwardly, but outwardly bowed in round compasse as long a space. And contrariwise, going from that same halfe part, vp to the Processe of the scaple bone, it is outwardly hollow, and inwardly conuered: the which kynde of crookednes nature deuised not in vaine: esteeming it moze fitte and necessary, that so the Clauicles might occupie their places, as rather *Aspera arteria*, and these needfull passages of the throte might not be hindered, or pceded, then that they should be directly stretched so, as might both obstinately resist those, and be neuer the fitter to Articulate with their places.

Agayne note, that for great reason the Cannell bone is rather forward, then backwardes prominent, and bearing out. For vnder that regio lyeth the progresse of principall vessels, caryeng the Animall, Vitall, and Naturall Faculties that is to saye *Vena axillaris*, and *Cephalica*, with an excellent great Arterie, beyng accompanied with the five Nerues, vnto the hand transmitted: to all which, the incurued or crooked part of the Clauicle notably giueth place, and is a mete propugnacle for their safe passage.

The head and vpper end of the Clauicle, where it meteth with *Acromion*, is broad, and depressed, haupng therein a cauitie exculped, mete to admittere the syde of the Processe, for the softer beyng thereto. But the other head and end is round, after a certaine manner, especially in that place, whiche the hole exculped in *Sternon*, receiueth.

Appendances notwithstanding are proper to both the heades; conered with their Cartilages: but to that end, that is setled in the brest, an other mozeouer is added: yet is their knyttng but after the maner of Articulation called *Arthro-dia*: Finally at the clauicles some Muscles haue their beginning, other some there ending: therfore it behoued some partes of them to be rough, ridged, or knotty: as may be sene in diuers places of the same bones, inwardly aspekyng, for the producing of Ligamentes, & Muscles: which may not escape vntouched, when we come to their descriptions. Lastly note, that as no part is destitute of nourishment, no not the Loynes, but haue that which is due to nourishe and maintayne them, so nature forgot not to giue vnto these, as also to the scaple bones last befoze rehearsed, some slender surcles, and twiggies of Veynes, which inscripyng their substance here and there, do duely feed them.

Humerus, whiche in Englishe phrase is interpreted the shoulder, is alway taken for the Processe, and large ridge or rising of the scaple bone, or shoulder blade called *Acromion*: so that all that we lay vpon this Processe of the scaple bone, we say we beare it on shoulder: but note gentle Reader that here accordyng to the Latin description, thou mayest permit me to vse an other phrase, and to vnderstand by name of shoulder, the hyghest bone of the arme, which be-neath, with *Radius* and *Ulna*, and aboue with the short Processe of the Scaple bone, is contoyned.

It is singularly numbred, and of all the bones of the arme, the greatest long, and round, but not largest of all others except the thighe: though Galen willed vs so to esteeme of it: for the great bone of the legge exceedeth it fare, and (as sayth *Collumbus*) it is neither equall to *Os sacrum* in magnitude, nor to *Os Ilium* in latitude. And notwithstanding that it is after a sort (for the most part) round, yet it is not of Cavities or corners, but is much vnequall, for the placynge, knyttng, and rising of the Muscles: the superiour part therof is round, and great headed, in dewed with a large Appendance: which is also, not sparyngly conered with a Cartilaginous crust, aptly inserted in the hole or cuppe of the Scaple bone: which

Why the Canell bones are crooked.

Why the Canell bones are forward moze promynent then backward.

The Clauicle descendeth Axillaris Vena and Arteria Cephalica, and v. Nerues.

The heades of the canell bone.

The head to Acromion.
The head to Sternon.

The Appendances of the clauicles. Two manner of Cartilages to the lower head of the canell bone. The articulation of the clauicles, referred to Arthro-dia. The Asperities and rough lines of the canell bones to what vse.

All bones are nourished with blood.

Humerus the shoulder.
A note to the reader what is meant by the shoulder least he be deceived.
The formation of Humerus.
The cubite consisteth of Vlna and Radius.

The description of the shoulder. Galen in error.

The inequality of the shoulder.

The appendance of the shoulder.

which hole with an other Cartilage is notably enlarged, supplying the want of thickness in the same Proccesse: whereby the hole could be no larger, as we haue touched before. The same vpper head hath also two Processe, with a corner, or gutter most euidently deuised: the foremost of them is lesse then the hinmost, and the greatest portion of them both, is within the compasse of the Appendance comprehended: and that cavitie or hollow, interiected betwene them, is a seat for the Muscle, which with a double begynninyng flowyng from the shoulder blade, is this way delated downward, to the bowyng of the cubitte. But the inferiour part of this shoulder bone, not beyng round as is before sayd of the superiour part, is (notwithstandyng) large, and variformed, eche side vnylike another, both in corners, heades, prominent partes, and such like. Among the which, we haue to note on eche side a hole, that is to say, in the fore side and hinmost part: although one of them in largenes, and depth, excadeth an other. As that in the inner seate forwardly, which receiueth the second Proccesse of *Vlna*, whilest the cubit is contracted and drawne in such wise, as the hand may touch the shoulder. But the hole in the hinder part of this lower head, is much deeper and larger, wherunto, when the cubit is at furthest extended, the posteriour and great Proccesse thereof, is roted and wheeled: being a stoppe and stay thereto, then which, no further it may passe. Wherefore *Hypocrates* calleth these holes *Sabrida*, beyng the seates, and groundes, of the cubittes motion.

But besides, this inferiour part, which we haue affirmed to be large and ample, riseth as it were in iij. heades, not much in space vnequall, nor in greatnes differyng, being excellently therfore (by the consent of all Anathomistes) compared to a pulley, wherein gutters are carued for the course of the ropes: so betwene these iij. heades or ridges, are two notable gutters or cavitie, excellently deuised by the third ridge, beyng the least of the iij. In one of the which gutters runneth *Vlna*, lightly to the extendyng, and bowyng of the cubitte: the endes of whose motions, are accomplished most exquisitely, by the Cavities before described: into which this gutter, due to *Vlna*, on eche side falleth the other gutter, situate in the space betwene the middlemost ridge, and the outmost head, yeldyng way to the inner side of the head of *Radius*, beyng deeply incrusted with a Cartilage, as also the head it selfe: which beyng moze round then the other, is Articulated and knit vnto *Radius*, although the same *Radius* hath not a hole so large, as might compyse the whole scope thereof: which (in my iudgement) had bene moze incommodious then needfull: for the outmost part of the inferiour head of the shoulder bone iutteth out moze inwardly, and lesse outwardly, then any other: and the reason is, because the vpper head of *Radius*, lurketh moze in the bosome of the inner region of *Vlna*: and that it should not comprehend such scope of compasse backwardes, the case is manifest, that in the extention of the cubit, when the head of *Radius* standeth vpon the toppe or hinder part of this hole or turne, then the posteriour great Proccesse of *Vlna* is denyed to go any further within the hole, exculped in the hinder part of this bone. And how the highest ridge of the iij. serueth notably, to hold in the exteriour side of *Vlna* in his motion, no man is ignorant. But this is to be noted of euery one, that the proper Articulation of *Radius* with the shoulder bone, offreth vnto vs the possibilitie of guiding our hand obliquely to the sides: and when it is extended together with the arme, such a motion is brought to passe by the benefite of *Vlna*, *Radius* consentyng onely.

Furthermoze, beside these heades before mentioned, there are iij. Processe extat at the sides of the lower head of *Humerus*, of which the inner is much the greater: to these productions are fastened the begynnynge of Muscles extēded to the extreme part of the hand. And although neither *Galen* nor *Hesalins*, with others in tymes past, haue knowen, or acknowledged any Appendance to this head,

I. iij.

where.

The cartilage encreasing the cavitie of the scaple bone admitting the head of the *Radius*.
The Processe of the appendance of the shoulder.
The use of the cavitie betwene the Processe.
The inferiour head of the shoulder bone.

The deepe cavitie one eche syde of the necke head of the shoulder.
The use of that cavitie on the inside.
The use of the cavitie on the outside.

The three heades in the inferiour part.

Comparisō made to a pulley.

The three head and middlemost is the least of the three.

How *Vlna* is inserted to the flexion and extension of the cubit.

The gutter wherein *Vlna* runneth, falleth from one of the deepe cavitie, into the other.

The head of *Radius* insert to the outmost gutter.

Why the outmost head of the shoulder beareth lesse then the other iij.

Why the outmost head of the iij. beareth no compasse backward.

The use of the highest head of the three.

The benefite of the insertion of *Radius* to the shoulder.

What motion is archewed by *Vlna*.

The iij. Processe of the inferiour head of the shoulder & their uses.

The inferiour head of the shoulder hath an appendance.

The first Booke of the

wherto the cubit is Articulated, yet *Realdus Collumbus* (whose sweating labours could neuer appale the insatigable courage of this searching skill) hath professed it euident in young Childre, neither can I esteeme thereof any otherwise, in bewyng the exteriour Processe for the insertion of Muscles, being the lesser of the two last described.

As touchyng the space betwene the superiour & inferiour head of this bone after the longitude thereof, you shall finde it somewhere Gibbous, or bunched, and other where hollow, & flatte, the which varietie of forme, is required by the sondry vses of Muscles thereto on eche side adherent, as hereafter shalbe sayd. And since it is manifest to every one, that this bone of the shoulder is inwardly concaved, as also all others like in the body, for the conteinyng of such due nourishment, as Nature by the small braunches of Veynes conueyeth into their substance, it shall not auayle me to speake moze thereof.

By the name of cubit we vnderstand the whole scope of length, betwene the shoulder bone, and the wrist of the hand conteinyng two long Bones, much lesse then the shoulder bone. Either of them are endewd with their Appendances sayth *Collumbus* but in the superiour part, where they be Articulated with the shoulder bone, the Appendances are but short, and transfused into the portions of bones. Yet neither *Vesalius*, nor Galen had knowledge of them but in the inferiour part, both the bones haue Appendances euident inough.

Of these two Bones, that which is lowest situated is called *Vlna*, commonly *Cubitus*, though (after the barbarous packe) *Focile minus*: but the vppermost *Radius*, and by the barbarous terme, *Focile maior*. They are ioyned together both among them selues, as well as with the shoulder bone, and wrist of the hand: although in the inferiour part, *Vlna* be committed to *Radius* onely: but in order, as we will declare anon.

The superiour part (notwithstanding) of *Vlna* being thicker, both end in two Processe, long, and triangular, yet not sharpe as Galen accompted them, but obtused and blunt: these Processe are so attolled, and prominent, as behoued them to follow the space, that is excaued in the middelt betwene them after the fashion of a halfe circle: the which cauitie, being shut in by these protuberatynge Processe, representeth the figure of a C in Latin, not farre vnlike in Græke and for that cause Galen named it *Sigmoides*. It was ordained, that aptly the same Processe might complect, and embrace the hollow or rounded gutter in the lower end and shoulder bone, as aforesayd, and to be turned about the same: Wherefore in the middelt of *Sigmoides*, we haue to discerne clearly, a prominent line, which in the middelt of the aforesayd gutter of the shoulder bone, runneth rounde, like a corde in the wheele of a pullie: whereby *Vlna* slippeth forth on no side, but on either side of the bones springeth mutuall ingresse: therfore this articulation may be attributed rightly to *Ginglimon*: to the first Processe, which is much lesse then the hinmost, and in the inner part thereof, where a cauitie is engraued for the purpose, the head of *Radius* is admitted sideway, and as it were leanyng to. But departing from these Processe, *Vlna* is the further downward, the moze imbecilled, and weakened, euen downe to the very end or head thereof: which sometime enclineth moze towardes the inner part, where in a slight cauitie, made in the side of *Radius*, it sleppeth. Neither is it ioyned with the wrist of the hand, as Galen supposed: for no portion of the wrist is found adherent to the lower head of *Vlna*. Furthermore, when as outwardly from this head of *Vlna*, a certaine litle Processe long, and sharpe, is produced, whiche the Grecian Anatomistes haue likewise nominated *Styloides*, Galen therfore iudged the same to be fastened to the outer one of the wrist, and so, by that reason, to become a meane to moue the hand obliquely, or slopewise: the which opiniō *Vesalius* worthely reproveth, and wholly con-

The brequall forme of the space betwene the 11. heades of the shoulder, and to what ende.

The inward hollownes of the shoulder containeth his nourishment.

The cubite what it signifieth. Of what partes the cubite doth consist.

Lib. 1. Cap. 24.

The cubite hath appendances in the vpper part. The inferiour part of Cubitus and Radius doe both their appendances long.

Vlna is also called Cubitus. Radius.

Vlna & Radius are committed together among them selues as also to others.

The vse of Sigmoides. Lib. de. off. Cap. 17.

Vesalius 2 ca. 24. *Collumbus* The vse of the line in the middelt of Sigmoides.

The articulation of the shoulder with the cubit is referred to Ginglimon.

How Radius to *Vlna* in the vpper part is ioyned. How *Vlna* in the neither part is ferred to Radius.

Lib. de. off. Cap. 17. Lib. 1. Cap. 18.

Galen in error. The Processe of *Vlna* called Styloides.

ly confuteth with most probable reasons. *Collumbus* (agayne) sayth it is so farre alienate from the nature of the thyng, and dissonant from veritie it selfe, as that the same Processe, to the working of the like effect in motion, as *Galen* would haue it, is rather a let and binderaunce, then any wayes a meane to further it. Neither is this Processe much distaunt frō the fourth bone of the wrist, although *Galen* commendeth thereto the big bone: which beareth veritie onely in an Ape. Notwithstanding, a certaine thicke & soft Cartilage is put betwene them, which supplyng the vacant roome, where it is put, holdeth meetly either of them, but therfore they are not coiyned. Nevertheless it may not be denyed, but that this Processe: addeth some strength vnto the wrist, lest it should altogether slippe frō that part: beyng therfore, so farre extended from the head of *Vlna*. To say briefly therfore, *Vlna* is in the exterior part therof, even, and round for the most part: but on the side towardes *Radius*, is a certaine rough line, extendyng after the longitude therof, with other light cavities: out of which places, spryng the Muscles scruping y to thōbe, as also that Muscle, that carrieth the fore finger frō the thōbe.

The other and uppermost bone, called of the Grecians *ῥαδις*, of the Latins *Radius*, occupieth (outwardly) the whole length almost of *Vlna*, endyng at ii. thicke heades, that is to say, both bpward, and downward: but as the highest is more round, so the lowest is much greater, and broader: which, considering how it is aboue articulate with the shoulder bone, and beneath with the wrist, you will graūt was not rashly deuised. For the shoulder on that side endyng round, after a certaine maner, it behoued the head of *Radius* also to be more depressed, & somewhat sinuous, to the end it might yeld meanes to the mouyng of the hand, obliquely bpwardes, or downwardes: which could not be, but by the round cavitie in the head of *Radius*, cleauyng likewise to the rounde head of the shoulder: by whose benefit, it is circumuerted, and turned round: to the which effect, the corner, which we haue sayd to be insculped in the inner region of the first Processe of *Vlna*, aptly obeyeth, the interne portion of *Radius* head, therein sitting: by the which double articulatio (also) of *Radius* cometh to passe, that it easily helpeth y flexion & extension of y cubit. The same head of *Radius* is copiously couered with a Cartilage, to encrease the agilitie of his motion. But frō this head, descendyng with a necke, somewhat long, and round, at the outward side towardes *Vlna*, thrusteth out a tubercle, wherewith is ended the first Muscle, that to the bowyng of the arme, giueth occasion: and also receiueth a portion of an other, endewed with the same function and office, which almost wholly, is implated to the superiour part of *Vlna*. But the inferiour part of *Radius* beyng (as we sayd) more depressed, and broader then the other, & not a little augmented by the helpe of an Appendance, is not onely at the end flatted, but also ample, large, and with a double bosome, or hollow excaued: wherewith, the two uppermost bones of the wrist, are inarticulated and knit: to which, since all the bones of the wrist els, are with a streit bond vnited, and tyed, we may worthely with *Collumbus* say that the whole wrist by the meanes of such coupling and tyng together, is destined to the articulation of *Radius*: whence it cometh, that it is not onely lawfull for the hand, to turne both bpward and downward, but also to be lead with libertie to eche side. Nevertheless, whē we will our hand to be bowed either obliquely bpwardes, or downwardes, that action is most worthely atchieued when *Radius* onely labourerth, *Vlna* resteth. But cū as *Radius*, to helpe & assist the flexion of the cubit, is aboue admitted into the of bosome *Vlna*: so it likewise (requirynge to y like mutuall societie, and deligence of *Vlna* in leadyng, and guidyng the hand, whilest it followeth the motion of the cubit) for the seate of the inferiour head therof *Vlna* mutually ordaineth a corner: as before we haue touched. Therfore *Radius* is aboue receiued of *Vlna*, but beneath receiueth *Vlna*: and this kynde of composition, is

The Processe Sciloides doth not giue the hand oblique mouing.

Sciloides is nearest to y wrist bone of the wrist not to the vlna. By what meanes this Processe is vnited to y wrist. The benefit of Sciloides.

The use of the cavitie and asperities in Vlna.

Cercis .i.

Radius.

The situation of Radius.

The heades of Radius compared together.

The cavitie aboue is bound to the shoulder but beneath to the wrist. Radius moueth y hand obliquely bpward or downward.

The use of the cavitie in the inner region of the first Processe of Vlna. The use of much Cartilage about y head of Radius.

The necke of Radius.

The use of his tubercle or huncer the necke.

The description of the inferiour part of Radius.

The cavitie admitting the y. uppermost bones of the wrist.

The wrist of the hand is tyed to Radius.

How the hand is moued both bpward and downward.

How the hand moueth bp and down obliquely.

How Radius assisteth y flexion and extension of the cubite.

The principall mouing of the cubite is frō Vlna.

Radius is aboue receiued, beneath receiueth.

The first Booke of the

The inferiour
head of Radius
why it is playne
and forward bend-
ing.
Why there be ma-
ny caviities in the
posteriour part of
the inferiour head
of Radius.
The use of Mam-
miller Procelle
in Radius.
The outsyde of
Radius.
The line in Radius
compared to the
lyne in cubites.
The use of y^e lyne
in Cubitus and Ra-
dius.
The use of the
Rhombyan be-
tween cubites and
Radius.
Why y^e bones of y^e
cubit are hollow.

Note.

How the hand is
divided by Ana-
thomicall descrip-
tion.
Brachiale.
Postbrachiale.
Digiti.

Hipocrates.
Collumbus.

Seven & twenty
bones containyd
betwene the cu-
bit and fingers
endes.
The volumes of
Hipocrates not all
alike.

What is y^e wrist
of the hand.

The wrist con-
sisteth of viij.
bones.
The bones of the
wrist are all vn-
like one another.
The first row of y^e
bones of y^e wrist.
The second rowe
of the bones of y^e
wrist.
How the bones
of the wrist seme
to grow together.

thought most aptly to be called *Arthrodia*: the Anterior part beneath of the head of Radius, is made playne, and even, though somewhat bending, that so it might give free scope and passage to the tendons of Muscles, which chalenge the bowling of the second, and thyrd ioynt of the fingers. After the same manner, the posteriour part giueth roome to the tendons of Muscles, stretched to the exterior ioyntes, whereby they are extended, and holden forth: therfore vnequally is that part replet with caviities. The exterior portion of the same head, towards the thōbe, putteth forth a certaine Mammillar Procelle, for no other cause, but to defend the wrist, so that in that place it may not lightly be lured, or displaced. Moreover the outer syde of Radius is rounde, and leuigated: but within hath (as it were) a sharpe edge, extended in lōg progresse, & distaunt from y^e region of the other line, described in the inner part of *Ulna*, very like vnto this. From either of the which lines floweth a certayn Membrane, to ech of them mutually fastned: whereby these ij. bones, so seuered one from an other, are colligated, and together in the middest after a certaine maner tyed. And this Membran maketh also a diuision, wherby the interior Muscles, of the cubit, are frō the exterior easily separated.

Both these bones are hollow within, and repleished with marcy: both that they might be the lighter, and also not frustrate of their necessary nourishment. **B**efore we fall to orderly descriptio of the wrist of the hād, this one thyng we note by the way: that by the custōmable maner, and frequented phrase of our English speech, this word hand, compriseth all the space betwene the inferior head of Radius, and the extremities of the fingers: which, by the order of Anathomicall description, is compounded of iij. partes: that is to say, *Brachiale*, which we call the wrist of the hand: *Postbrachiale*, which is the space betwene the wrist, and the first ioynt of the fingers: the thyrd part then is *Digiti*, or the fingers: whereto hereafter we will come in order. And it seemeth also, that *Hipocrates* vnderstode the like that we do by the name of *Manus*: although *Collumbus* writeth in his chapter of y^e shoulde, that *Hipocrates*, called the whole length from the scaple bone, vnto the extreme endes of the fingers, *Manus*: whilst it is otherwise euidēt in his booke *De ossium natura*, *M. Fabius Caluus* being interprete: where he hath these wordes: *Manus quidem ossa septem & viginti sunt.* &c. the which number, may stretch no further then from the first of the fingers, to the last of the wrist. But that the volumes of *Hipocrates* are not altogether consonant, and agreying together, appeareth not onely by this, but is witnessed in the same translatio of *Hipocrates* wordes, wherof *Fabius Caluus*, *Gulielmus Copus*, *Nicol. Leoniceus*, and *Andreas Brent.* were interpreters.

A length returnyng to the first of the thre diuisions of the hand, which is called of the Grækes *αρθρον*, the Latins haue in steade thereof (as is sayd before) *Brachiale*: it is to be vnderstanded the whole strewe, and packe of bones, interlited betwene the cubit, & *Postbrachiale*: which is y^e middle of y^e hand, (whereto I can giue no proper Englishe, except I shall call that part the backe of the hand, or after the Latins the *Postbrachiall* bones.

The number of the bones that constitute the wrist of the hād are viij. distinct, & ioynded in double order: that is to say ij. rowes, contriynge in ech iij. bones, all diuersly fourmed, not one like an other either in magnitude forme, or situation.

The first row of these bones are vpywardly, so comitted to the head of Radius, as that the first, and second thereof, are fastened within the bosome of it, the thyrd seemeth a litle to enter, but the fourth seemeth to be ioynded to no other bone but the thyrd: whereto it is stiffly annexed. The second course or row, is articulate in their posteriour part, to the *Postbrachiall* bones, but in the fore part, with the other bones of the wrist: which among them selues, are so connected and knit together with Cartilaginous Ligamentes, as that they seme to grow together.

As

As I sayd befoze, they are so straunge, and diuersly fashioned, that a man can not rightly inuent, whereto to compare them: yet notwithstanding, and although they are not endewd with proper names, they are sufficient easie to be discerned, iudged, and knowne, by their number, and order: which is after this sort.

The first bone of the wrist is that, which appeareth vnto vs in the inner side of the first ranke, towarde the thombe.

The second succedeth the first.

The third, is with the second coherent, at the outer side towarde the litle finger, or cubit.

The fourth and least of all is knit vnto the third.

The fift is the first of the second ranke, and next vnto the thombe.

And so thence the vi. vii. and viii. do follow in order.

And thus, as you see in number, and figure, they are different, so also in greatness, and lileness. For the greatest of all are the first, and vii. of which ij. it is hard to iudge the greatest: the second is lesse the these but bigger then all the remnant: then chalengeth the vii. and after him the fift, the first next, so then the third: the fourth of all others (as we sayd befoze) is least.

Now as touchyng their vnion, & order of composition: which ought aswell to be knowen, and considered, as all that we haue hetherto, spoken of them.

The first bone therofe (besides that it is articulate with *Radius*), in the superiour part therof, where it protuberateth round, cleaueth to the second, entryng the cauitie therof, and admitteth into it the round head of the seventh: as also in the inferiour part, is coherent with the v. and vi.

The second, not onely vpiward, entreth the hollow of *Radius* together with the first, but in the inferiour part, where it is hollow, is connected with the vi. and in the posteriour part with the third.

So likewise the third is ioynd with the second, and in the lower side toucheth the vi. and in the hinder part inwardly, towarde *Ulna*, meeteth the fourth.

The which fourth we finde committed to none other.

The fift next, in the vpper part with the first, in the hinder part with the vi. & is adherent to the prominent Processe of the second bone of *Postbrachiale*, (if by the way, we constitute, as *Collumbus* would, v. bones thereto, wherof more hereafter) the inferiour portio therof the first bone of *Postbrachiale*, which *Galen* maketh the first ioynt of the thombe, receiueth.

The vi. is knit to the first, fift, & seventh, on that side where it respecteth them: but with the inferiour head, or swelling, it is fastened to the angular bosome of the *Postbrachial* bones, from thence respecting the third also of *Postbrachiale*, whose first, and longer produced portio it sustenteth.

The seventh endeth at the first, second, fift, and vi. but not equally, or in like order committed to one, as to an other: since it hath some sides hollow, others boled, or gibbous. Notwithstanding in the inferiour part, it is rooted to a portio of the third, and fourth bones of *Postbrachiale*.

Lastly the viii. which is highest, on the other sides is coupled with the second, third, and vi. and in the inferiour part, it is a seate vnto the fourth, and fift bones of *Postbrachiale*: to which also it is coarticulated, and knit.

Thus to speake briefly of these bones of the wrist, although there cometh no peculiar Muscle vnto them, as the author of action, wherby we iudge it obscure: yet are they not vnmoueable, or wantyng motion in deede, but yeld to the spring of the hand, both vpiward, downward, and to the sides.

Moreover in the interior part of the wrist, we finde a broad, and deepe cauitie, or bosome, through the which are concurrent, not a small number of tendons of Muscles, to be inserted to the ioyntes of the fingers. And in this balute, or hollow,

R. i.

low,

Bones of the wrist.

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6. 7. 8.

The vnion of the brachial bones.

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Galen.

6.

7.

8.

The bones of the wrist haue oblique mouing.

The wrist moueth & had downe up, and to the sides.

The description and use of whole wrist.

The bawle on the inside of the wrist.

The first Booke of the

The use of the Ligament from the Proccesse of the viij. bone.

The use of the Proccesse of the viij. bone.

How the bawle in the wrist of the hand is made.

The outside of the wrist how it is, and why such.

The use of the lower Ligament: one the outside of the wrist.

The bones of the wrist are not solid. The fourth bone is almost altogether solid.

The fourth bone for his proportion is no more solid then the rest.

The fourth Ossicle hath no cavitie as Galen saith.

Cap. 25. In Apes Galens assertion is verified.

The ignorance of Corn. Cels in the bones of the wrist. Lib. 1. Cap. 3.

How these bones are conjoined among the selues and with others.

What is Postbrachiale.

Cap. 26. V. part. lib. 2.

The Postbrachial bones.

Cap. 26.

The first bone of the thombe a bone of the inside of the hand.

The first ioynt of the thombe, how ioynted to the fist bone.

low, they same as it were included, or locked vp, for overflowing their seats with a strong Ligament, produced from the Proccesse of the viij. bone, and inserted ouerthwartly to the side of the fist. For which purpose, that their being might be more safe, and their scope more free, nature caused the same Proccesse of the viij. bone, to hang, and houer inwardly lyke a sailed vauelte: so that the space, or distaunce, betwene the head or extremitie of the same Proccesse, and the fist Ossicle (which with the side somewhat also leaneth towardes it) is nothing so much, as we discern in the compasse of the hollow vnder.

But the exterior part of the wrist, is the way for the tendons on the outside runnyng to the fingers: yet notwithstanding, it hath no notable cavitie, but rather is boled, or rounded outward: for asmuch as those tendons are much lesse then they of inner side, and therefore (also) occupy lesse space. So accordingly therefore it was decent, that the extreme region of the wrist of the hand, should carie a circular kynde of fourme, and the interne, playne. Yet albeit the inner side by the afore sayd valley, or vauelte, seemeth to make a most apt way, and safe conduction for the tendons, produced in that region: so must we consider, that they of the extrinsecall region of the wrist, are not rashly left, or inordinatly giuen over to libertie: for so in bayne had growen forth the foure Ligamentes on that side, which clothe, and so surely bynd them in. Galen in his viij. chapter of bones, affirmeth these Ossicles of the wrist of the hand to be hard, and solid, but not any thyng medullous: as *Collumbus* (not rashly) since his tyme hath assured vs: though amongest all the rest, he sayth, the most hard, and almost altogether solid bone, is that, which in the fourth place we haue here before numbred.

But if any industrious Artiste, shall at any tyme fortune to finde the contrary, I for my tyme am fowt to confesse, me neuer to haue inuited, or proued the like Soliditie in the fourth, and little Ossicle: neither any more (considering the quantitie therof, then in the rest, albeit it may seeme very likely to some, by the littleness therof. That it should also haue a certain Celle or corner, answerable to the Proccesse *Syloides*, produced from the inferior head of *Vlna*, let no man belcue, although Galen him selfe haue written it. For neither hath the same Ossicle any such cavitie, neither doth the same Proccesse in the wrist of a man, reach, or extend so farre: as vnto it, wherefore in Apes *Collumbus* verifieth this his Assertion, in me the truth standeth otherwise. *Vesalius* noteth the composition of these bones, to be so excellently compact, and wrought together with Ligamentes, as, vnlesse they be diligently cut, and fret away, together with the Membrans, we might suppose them to be all one bone, and altogether vncertain to iudge how many, as *Cornelius Celsus* in his viij. booke, and first chapter, confesseth him selfe inscient, by accompting their number vncertaine. Their mutuall coniunctio (sayth *Fernelius*) is *Synarthrosis*: their ioyning with *Radius* (sayth *Collumbus*, confessing likewise the other) by *Diarthrosis*: and with the bones of *Postbrachiale*, partly by *Synarthrosis*, and partly by *Diarthrosis*.

This *Postbrachiale* (as partly we haue touched before, called of the Grecians *μτακχρηον*) is that part of the hand, which inward we call the palme, but outward the backe of the hand. Whereto accordingly, *Fuchsius* saith, some of Galens interpreters haue called it *Palma*, others *Manus Petus*, and so forth. *Vesalius* sayth, and before him Galen, that this part of the hand, namely *Postbrachiale*, is construed onely of iij. bones: in the whiche number is left out the first of the Thombe, which *Collumbus* would (most properly in my opinion) haue added: & that not without good stay of reason: since it as nearely succedeth the bones of the wrist, as the other: being also after the same rate committed to them, saying that the Articulation therof, is more slacke then in the rest: whereby (also) it purchaseth a more euident motion. It is fastened vnto the fist bone of the wrist, by

Arthro-

Arthrodia vnder *Diarthrosis* although (by reason of those bones which be small) such manner of Articulation may be referred vnto *Enarthrosis*. For the fist bone of the wrist hath a cavitie sufficient playne, as a corner erraues, whereunto, the head of the ioynt, after a certaine manner long, and forward protensed, or stretched, is innitted.

The second *Postbrachiall* bone, which Galen numbzeth the first, endeth at a deepe cavitie in the superiour part, where it receiveth the proturberant, or bossed head of the vi. *Brachiall* bone, and ioyneeth his side to the side of the fist: wherefo, in that maner it seemeth to claue.

The thyzd hath also a hollow end, & in the inner part, towardes the thombe, stretcheth forth as it were a Proesse, whose face, or outer bozder is settled to the vi. bone of the wrist. The remaunt of his Sinewes, or hollowed head, admitteth the viij. Bone.

The head of the fourth is foure squared, beyng ioyned with ij. bones: that is, part to the seuenth, and part to the viij. those partes beyng also flat, aunswerable to their squarenes: but somewhat inward decliued with all.

The last hath likewise a foure squared head, but somewhat toward the outer partes tending, and cleaupng also to the extreme portion of the viij. and last bone of the wrist.

After this sort are the *Postbrachiall* bones committed to them of the wrist: where as also you haue to note, that as their endes are squared, and flatted of sufficient compasse, towardes those bones, wherefo they are set, and ioyned: so their sides also, do mutually yeld one towardes an other: as the last to the fourth: the fourth to the fist and thyzd: the thyzd to the fourth and second: and the second to the thyzd on that side and to the side of the fist bone of the wrist outward: onely except the first, which suppozteth the thombe, and hath moze ample scope, and distaunce fro the rest, then the other haue among them selues. But agayne, beneth in the lower endes of the *Postbrachiall* bones, where they be together with the ioyntes of the fingers Articulated, all end with one maner of head: which beyng round, do enter the holes, or hollowes in the endes of those ioyntes, lightly erraues, & that (as was requisite) with a slacke, or romthpy kynde of knittynge.

To describe them after their longitude: the other iij. *Postbrachiall* bones beside the first of the thombe, from their first heades, goyng forward, towardes the fingers, become smaller, and slenderer, vntill their middle part or region where (beyng smallest of all, and their substance most lightned) they begyn agayne, from thence afterwarde, to augment, and engrosse their substance: so that, to speake clearely, as they first decreased to the middest, and wared weaker, so now also from the middest downewardes they encrease, moze, and moze, in thicknes and strength, and that moze apparatly in those ij. which admitte the middle, and the ringfinger: the other ij. for the foze most, and litle finger, haue in meane sorte the like delineation.

In the inner side of these bones, all after their length, runneth an angulare, or cornered line in the middest of them: made for the cause of the Muscles to them adiacent, as also doth the attenuation of them, towardes to the middest as aforesayd. For so the Muscles haue commodious scope, and room to cleaue vnto, and betwene them: or els the palme and hollow of the hand, should haue bene moze hugely heaped, and stozed with them, then had bene conuiuent for the prompt translation, and handling, that now appertaineth to the hand.

Besides, the *Postbrachiall* bones are aboue, and beneth, defended with Appendances: from whence Ligamentes customably are produced: by whose benefite (also) these bones among them selues, are together connected, and bound. Neither are they inwardly distitute of their proper hollownes, to maintayne their

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Their Composition.

How the *Postbrachiall* bones are beneth ioyned to the fist ioyntes of the fingers.

Postbrachiall bones their longitude, & thombe excepted.

The vse of the angulare line.

Why these bones are attenuated in the middest.

The appendices of the *Postbrachiall* bones and their vse.

The first Booke of the

substance, with dew medullous nourishment.

It resteth now to speake of the fingers: which once discoursed in that order we haue begon, we shall leaue the hand, with the partes therof, sufficient playnly, and also narrowly touched, as farre as the description of Bones may extend: for throughtly to explicate the maner of their motion, it becometh not here to expect, but onely in the History of Muscles: where their proper actions to decyffer, we haue wholly determined.

Bones of the fingers. 15.

Now the Bones that constitute the fingers are in number xv. that is to say, iij. in euery one. In the which accompt (lest I should seeme to repugne the sentence of most famous writers, and Anathomistes of rare experience) the first bone of the thombe is comprehended: which *Collumbus* would haue numbred among the bones of *Postbrachiale*, as befoze is touched. Neuerthelesse if reason in your selues, shall cause you consent also to *Realdus* his iudgement, and to attribute the first of the thombe to the number of the *Postbrachiall* bones: the there remayneth but ij. the thombe, and consequently xiiij. to the number of the fingers: for the *Sesamine* Officles, which hereafter we will declare, are neuer numbred amongst them: but how soeuer they are numbred, it becometh vs now to appropinquate, and touch the effect: and of their quantitie, fourme, and combination to say as it is.

How the number of the bones of fingers are but 14

Collumbus Cap. 27
The substance of fingers of what sort and why.
The bones of the fingers are not Solid.
The difference of the bones of the fingers.

The substance therfoze of the bones constituting the fingers, is hard, to the end, that without daunger, they might promptly be applyed to the innumerable functions, whereto they are created: yet, notwithstanding their hardnes, they are with in replenished with the like nourishment dew vnto Bones: as lately we described in the *Postbrachiall*, therfoze are not Solid, howsoeuer *Galen* iudged them. Nether are they all of like quantitie, in length, or in thicknes. But some longer, others shorter, some thicker, others more slender: that is to say, the thicker or longer fingers, merite also the thicker and longer bones. In like sort, the first ioyntes, are greater then the second, the second, greater then the third, and so the third, being last, are also least in all the fingers.

The fourme of bones of the fingers.

Furthermore a double, or ij. fold fourme remayneth to these bones: in one of which, all the ioyntes agree: but the other, much vnlike the first, the last ioyntes obtayne common to them selues: for their bones are more depressed then the rest, and being in the begynnyng somewhat broad, the further forth they stretch, the more also are they attenuated, and stretened, vntil they haue prepared as it were a necke: whereto is annexed, and supposed a litle head, wherewith they end. The same head is round and long: but the first ioynt of the thombe, and also the first, and second of the other fingers, haue both their begynnyng, and end more grosse, and thicke: that is, both their extremities are consistent in heades: whereof, the uppermost, is greater then the neithermost: and all the whole space, from the uppermost head, to the nether, is made more slender, and slender.

The bones of the fingers, ende at a head.

The figure of the first and second bones of the fingers.

Why the fingers are somewhat hollowe one the inside.

Furthermore these bones outwardly, are made (as it were) crouking, or bending inwards: but on the inside flat, and rather sinuous, or hollow: because there ought to runne no small, but round tendons, which with their magnitude, and rotunditie, fulfill the flatnes so on that side, that the fourme of the fingers (neverthelesse) is left round: whereas otherwise, to great a heaped ridge should haue bene couched on that side, to no lesse hinderance, and hurtynge of the action of handling, and apprehending, then vnapt, and incommodious, for the quiet situation of those tendons: which, the bones being round, could haue had no certaine seate: but in the extension, and stryking of the fingers, to slippe on this side. On the outside of the fingers it is otherwise: for their subtil tendons are produced after the maner of Membrans: so, that that part be round, they hinder not, for the more elegancie of the fingers fourme.

How the tendons one the outside of the fingers are casied.

Like

Likewise in the inner region of the fingers on eche side, are certaine lines carried after their longitude: whence the Ligamētes, which complex and hold those tendons in their places firmly, haue their originall.

To speake of their maner of knittynge, and composition, some receiue onely: other again both receiue, and are receiued: (although Galen saith, the head of the first bone, euer entreth the cauitie of the other following) for the first bones of the fingers are ioyned aboue, with the *Postbrachiall* bones *per Enarthrosim*: because their heades beyng situated, and incruised with a Cartilage, do admit into them the round head of the *Postbrachiall* bones: which is *Enarthrosis* Articulation: being in this place right requisite that fingers might haue free scope to all sides, and turnes: though *Vesalius* denyed them their circular motion, or round turnyng, as *Collubius* noteth.

In the inferiour part of these bones, are prominent two heades, bettwene which, one angular; or cornered cauitie is engrauen, into the which entreth the middle portion of the head of the bone following, beyng, for the purpose, lightly protuberber, or swelled forth: and those heades agayne, are likewise inserted to the cauities, exculpēd on either side in the other. Whereby it is manifest, that these ioyntes both receiue, and also are receiued: the which maner of Articulation is called *Ginglymon*, and that is to be obserued in the other ioyntes also. But bettwene them all are interiected Cartilages, to make their knittynge easie, neither not their actions prompt: Appendances are not wantyng, whiche at eche end, are wont to gard them: except the extreme endes of the last bones, whiche needyng no articulatio, neither are Appendances to the acceptable: for there the fingers are notably munit with nayles: which here we omit to speake of, but are not forgotten among the Cartilages.

Thus if we wel perpend the construction, and composition of the partes, and bones of the hand, our senses shall sone conceiue the maner of the action, with no lesse admiration, in beholding the handy worke of the incomprehensible Creator: who not one mite, or portiō of a part hath sited any where, that serueth for no end, or vtilitie to the body: for how fit to appprehēd are the handes, and how prompt to moue are the fingers, who is it that knoweth not? whiche made Aristotle call them instruments, or organs, before all organs, or instrumentes: and they are prest, necessary, and exquisite: wherefore sayth Galen in his first *De vsum partium*: as they might not be created without bones, neither had it bene requisite for the to haue bene made of one bone: but to euery one iij. knit together by ioyntes: thereby to become prompt to euery actiō. For often, we neede not to extend, or to reflect, and bowe all at once, but sometyme the first onely, or second, or the third ioynte, sometyme the first together with the second, or the second and the third, els the third, with the first extendyng, or bowyng: by the which, Galen expresteth the v. generall differences of the figures in appprehēdyng, or holdyng: but the particulars, which are brought to passe as occasion is offred, either more, or lesse, he accompteth innumerable: so (sayth he) if the hand had not bene deuided, it had also behoued eche thyng we should handle, to be of equall bignes: but now being (in dede) deuided into many partes, we are no lesse able to appprehēd with facilitie greater thynges, then ready, & nimble to touch ech litle substance.

Nature therefore (as Galen in the place before cited sayth) finely framed five fingers in either hand: so that as nothyng might be wanting, neither should any thyng be to much. For thinke not, that rashly nature created one finger longer then another, since thereby they obtaine this notable propertie: that although, when they be at libertie extended, some surmount their mates clearely in length, yet that is wonne agayne, when we comprehend any thyng within the compasse of of them, or hold any liquid substance within the palme of the hand: for then you

will

The bles of the
lynes in y inside
of the fingers.
The articulation
of the fingers.
Lib. de ost. 19.
Galen in errore.

Why their ioyntes
are intelayd with
Cartilages.

What Bones
haue the appen-
dances, which not,
and why.

Of the exquisite
structure of the
hand.

The actiō thereof.

It is an Organ
before all organs.

Fingers why co-
poled of bones,
and ioyntes.

Generall differ-
ences of Appre-
hension are v.

Why the hād be-
uiled into fin-
gers.

Why Nature
made v. fingers.

Why one finger
was made longer
then another.
Why a compen-
sation is made the
fingers are all of
one length.

The first Booke of the

will confesse this inequality of the fingers, to present a most manifest vtilitie, and decent kinde of fourme. Finally this his saying is also worthy to be noted. As man, of all other creatures, is the most sapient, & wise: so also hath he handes, the most conuenient instrumentes to a sapient Creature: yet not in that he hath hands, therfore he is the wisest, but because he is wisest, therfore he hath handes: for not handes, but reason instructeth man in Artes. So likewise, the handes are the instrumentes of Artes: and thus much of the fingers, the last part of the hād.

The next that followeth in order to intreate of, after the partes, whiche we haue already gone through, is that bone, which is committed, and ioyned to the transuerse Processe of *Os sacrum*. In persons of full growth, and ripe yeares, although it seeme one bone, yet is it esteemed of, as if it were iij. and the reason is, because in children and youthfull yeares, it is by a Cartilage intersected with iij. lynes: therfore (also) it is deuided by Anathomistes into iij. partes chusing iij. diuers names: for the supreme part therof beyng the broadest of the rest, and committed to *Os sacrum*, is called *Ilium os*: an other part is that, which beyng not so broad: as the superiour, is thorowd on ech side, with a large & ample hole, and is called *Os pubis*: then the middle part, which is streter, and thicker, & outwardly engrauen with a deepe & large caue, is called *Coxendicis os*. These bones are ij. in number: that is to say, on either side one: which although they be ioyned to *Os sacrum*, yet their proportion seemeth to aunswere no lesse vse, then the scaple bone vnto the shoulder: for these after the same rate receiue the thighe, as those do the shoulder: and also the originall, and diuers insertiōs of Muscles. But as befoze we haue sayd, they beyng ioyned to *Os sacrum*, do minister to all the composition of bones, that most necessary seate, and ground: for these beyng ther to perpetually abiding, are neuer required of any motion: when as all other members about them, of very right, do styre and moue: which most euidently we may discern, in seying all the motions both of the superiour, and inferiour partes excellently percurrent, and yet at length to cease, or end at these bones: as it were, there certaine centre, and pike: for *Ili ossa*, are so firmly to the same *Sacrum*, committed, as that they seeme wholly growne thereto: wherfore *Columbus* recordeth of a Sceleton he hath, whose *Ilium*, on the left side, is so connated, & growne to *Sacrum*, as that it may not, by any meanes, be disseuered. These same bones likewise in the fore part, do meete, and ioyne together. Their bearyng outward, is esteemed to represent the figure of a bason: which nature so ordayned, for the safer conteyning and holdyng of the matrice, bleddar, and intralles: to the safetie of the which, these bones are chiefly prest. The figure of these bones is diuers, for on the hynder part they be broad, and insigned with ij. cauities, whiche rather seeme crooked, or bowed, then hollowly excaued, or engrauen: since it is euident, that the same partes on the contrary side, are asmuch conuered, and Gibbous: whereas also much asperitie and roughnes is, chiefly outwardes, and seruyng to the insertion of Muscles.

The vpper region of this part of *Ilium*, beyng drawn after a Semicircular lyne, is clothed with an Appendance all a long the same cōpasse. And because it is somewhat prominent outward, therfore it is called the spine, or ridge: from whence especially flow Ligamentes, and the exorture of these Muscles, that constitute the buttockes: as also, those that downwardes to the thigh, and legge, and vpperwardes to the brest and backe, are caried. As touchyng their fastnyng vnto *Os sacrum*, nature hath decreed a mutuall congresse, whereby their composition is made more strong, and pertinacious: wherfore, the transuerse Processe of *Os sacrum*, as they are excised, and engrauen, somewhere with large and deepe, other where, with lyght and shallow concauities: so likewise are these Bones in the settyng to both, endelwed with conuenient cauities, as also other mate portions bound

The handes are organs most conuenient for a wise creature.

The handes are the organes of artes.

Os Ilium.

Os Ilium in children three, in man one.

Os Ilium.

Os pubis.

Os coxendicis.

The seate of foundation of bones.

All bones above and beneath Ilium, and Sacrum, do moue, but they onely not moued.

Ilium sometime groweth to Sacrum inseparably.

Where these ij. bones ioyne.

The figure of Ilium.

The vse of the asperities in these bones.

The description of the superiour part of Ilium.

The spine in Ilium what and the vse thereof.

Ioyned by nature

bounced forth, and protuberated. So that in meeting together, the hollow places of these, receive the rough knots, or eminences of *Os sacrum*, and in lyke manner, their protuberated or swelled portions, are admitted into his agreeable cavities. And this congreffe is mutuall: to the which union, a Cartilage also is intercedent, which, after the manner of glew, holdeth, and ioyneth them together. Whereby there Articulation may be thought like *Ginglymon*: but, since no kynde of motion is atchieued thereby, we accompt it more like unto *Symphysis*: and thus farre the description of the superiour part.

Now, that portion thence declining towards the Anterior partes, occupieng the middle space of the bone, and endewd with the name of *Coxendicis os*, is most thicke: that the more commodiously therein (and without to much weakenyng, or decaying the bone) might be made the large, and deepe hollow, or cuppe, into which is immitted the long, and round head of the thigh. Wherefore it is called a cuppe, or bowle: which although (in dede) it be of it selfe very large, yet because it could not be so deepe as wholly might containe the head of the thighe, a Cartilage is thereunto added, as is betwixt the scaple bone and the shoulder: whereby the hollownes therof is fulfilled at large. And this cuppe, or concavite, not onely occupieth part of *Coxendicis os*, but of *Os ilium* also, and *Pubis*. And besides that Cartilage, which in manner of a crust circundeth and compasseth aswell the head of the thigh, as the cuppe wherein it is contained, there riseth about the borders and edges of the same hole, a certaine thicke, & circular Cartilage: which nobly augmenteth the capacite thereof: and so compleateth the deepe head of the thighe, that, not without great rigour, & extreme violence, it may be fro his seat lurated. And further, to the end y^e head of the thighe might yet more firmly, and safely rest, within the same acetabulum, or cuppe: out of the middest of his crustie Appendance, groweth a round, and most strong Ligament, whiche is likewise fastened in the middest of the same cavite: and in this manner is firmified his Articulation, which otherwise was slacke and lose.

The inferiour parte, whiche is interstitied betwixt *Ilium*, and *Coxendix*, is endewd with a notable kynde of hollownes, byssing out, or cut through in the lower part: so that it is a way evident, and open on eche side, or common to both the bones, or bayned (as we may easely suppose) as a way, for the subduccion of very many, and large surcles, and bzaunches of *Sinewes*, profluent from the spinall marcy, through the holes in *Os sacrum*: the which, after, not fare thence, do coite and iojne together in one, the greatest of all the Nerves in the body: which downwarde is disseminated, amongst the Muscles of the thighe, and legge: as more in the hystory of Nerves. But, departing from this corner, or deepe niche, more forwarde, there riseth a certaine sharpe Proesse, whence is produced a Ligament to be inserted unto *Os sacrum*, prepared to inclose the fundamēt, and that greatest Nerue lately cited. Agayne, besides this Proesse, neare to the bottomic or seate of *Coxendix*, there is an other hollowed corner, being broad, but more shallow then that before sayd: and is (as it were) cut here and there in the middest, with certayne chynkes, to the which are inherent foure tendons: reconcited, and hidde in their Muscle, as if they were in a purse imposed: whiche at length also do agree together in one, to be sent, and solwed in the thighe. The inferiour portion of the thighe is most thicke, which therefore is nominated the seate, or foundation therof. This one amongst all other partes of *Coxendicis os*, is endewd with one Appendance, whence springe the iij. Muscles, that serve to bowe the legge. And now it resteth to speake of the Anterior part which is named *Os pubis*: being thinner both above and beneath, then the rest: these, the nearer towards their middest, are the more also attenuated, untill they become cleane through perforated, and that with a most large hole: about they are ioyned together,

The order of this mutuall congreffe.

The Cartilage in seate of glew.

Col. cap. 28.

Why y^e articulation of *Ilium* & *Os sacrum* is referred rather to *Symphysis* then to *Ginglymon*.

The description of *Os coxendicis*.

Why it is y^e thicke.

The use of cuppe or concavite of *Coxendicis*.

The Cartilage clothing this concavite.

In what partes this concavite is made.

The articulation of the thigh to the cuppe and wherby in proportion to the shoulder with the scaple bone.

A circular Cartilage augmenting the concavite and why.

Of the Ligament within the concavite the situation and use.

The hollow corner betwixt *Ilium* and *Coxendicis os*. The use of y^e hollow corner.

The beginning and journey of y^e greatest nerve.

The sharpe proesse and the use therof.

The use of the hollow about y^e seate of *Coxendix*.

Foure tendons in their muscle as in a purse conjoined.

Why y^e inferiour part of *Coxendicis* is thicke.

Why the seate of *Coxendicis os* hath an appendance.

Of the bones of *Pubis*. Col. libid.

The holes of *Pubis*.

The first Booke of the

How the bones of Pubis the right and left are ioyned together.
To say that these bones in child-birth doe open is a laughing matter.

The bones of Cocciæ are in childbirth retracted.

In the largenes and narrowness of Pubis men differ from women.
How the bones of Pubis in women are distinguished from those in men.

The bones of Pubis are not dilated.

Why the bones of Pubis are downward disposed.

What Arteries spring from the superiour part of Pubis.

The inferiour part of Pubis hath an appendance.

The situation and originall of the Arteries sustaining the part.

The hole in the middell of the bones of Pubis why it is made.

A Resemblance betwene the Arteries that turne about the thigh.

The iourney of the seminary vessels.

By this gutted cautie Realdus distinguished the bones of a man and woman yet I haue sene them absent in the bones of a man.

Holes in these bones for the dilatation of nourishment.

Man onely and the Ape hath the bone in the thigh greater then the other bones.

The thigh is shorter then the legge in other creatures.

The figure of the thigh.

The head of the thigh.

The necke of the thigh.

ther, the right meeting with the left, by the interuention of much Cartilage: the which knitting is so firme, and solid, as hardly with the knife, it may be separated. Wherfore, great occasiõ of laughter is offered by such as haue not bene admonished, openly to publish so much, that these same bones, should in women byrnyng forth, be losed, and departed one from an other, thereby, that more easely, the byrth might be extrahed. Notwithstanding, it is verified in the tayle bone, as we haue sayd before in his proper place. For that is certainly retrahed in women, helping greatly to the byrnyng forth of child: but to affirme the departing asunder of these bones in such seasons, is, no doubt, a saying so absurde, as what to be more, I know not: since it seemeth nature was nothing forgetfull of the byrnyng forth, & increase of young childre in making the womans mould: but if it were so, why then in bayne, did she constitute these bones in women of farre larger scope, and compasse then in men? A thyng notable to be marked. By this therfore, it is nothyng difficult, to descerne these bones in women, from those in men: for in men they be more streit, and narrow, both aboue, and beneath: but in women much more ample, and roomy: wherfore let no man beleue *Os pubis* to be dilated or opned in child bearyng.

But now agayne from the same coniunction in *Pubis*, which we haue sayd to be confirmed by a Cartilage, the more downwardes they go, so much more and more also one side seuereth from an other till they haue left a voyde, and empty corner, for the subsistynge of *Penis*, and the Testicles. And in the superiour part, where these same bones of *Pubis* are conioyned, as is aforesayd, they are one each side roughe, and aboundyng with a double Tubercle, or protuberance, and bounded portion: from the which haue sprung both the streight Muscles of the belly, as also, those that be deferred downe to the thigh, and legge: and abyde the insertion of the oblique descendentes of the belly. But from the inferiour part, so armed with an Appendance, are produced the Muscles sustaining *Penis*: whose body is situated, immediately, after the vnion of these bones. That large hole in the middell, being supposed rather for lightnes sake, then for other cause to haue bene made, two Muscles, an outer, and an inner do fulfil: which stretching thence downwardes, and implanted in the thigh, minister thereto the power of circumaction, or turnyng about: betwene which, runneth a tough Membran, both shutting the way of the same hole, and distinguishing the one Muscle from the other. Then (henceforth) let them with more modestie aduise them selues, that heretofore, haue rashly affirmed the seminary vessels, by these holes, to descend vnto the Testicles: when as it is most euident, they perforate the Muscle of Abdomen, & aboue these bones are caried. In which on each side is a certaine litle hollow gutter, in their toppes obliquely decliued, or bendyng over, by the which couertly runne, as well *Deferentia*, as *Preparantia vasa*. But this cautie in women is not found: which is the chiefest difference, betwixt those bones in men, and women.

And thus iudge of the bones committed to *Os sacrum*, being not much different from the same in substance: for they be fungie, and light for the most part, not very hard, but replenished with holes, or litle porie places for the receit of nourishment perpetually to cherish them.

The thigh bone neither in byrdes, neither almost in any foule footed beaſt, is in length comparable to the bones of the legge, exceptyng the Ape: but in man, it most playnly exceedeth all other in magnitude, and is Articulated aboue with *Coxendix*, *Ilium*, and *Pubis*, but beneath, with *Tibia*. The figure of the thigh is long and round, but not euery where straight: for neare vnto the middell it crooketh, being therfore in the fore part Gibbous, but in the hinder and exteriour part Sinuous, and (as it may be sayd) backwardes bendyng: the vppermost head is thicke, round, & ouer cruſted with a Cartilage, hauyng the necke therof, which

is lōg, much inwardly p̄tēd. And this same head to that necke supposed, is almost wholly affourmed by an orbicular Appendaunce, & is admitted within the acetabule or cup of *Coxendix*: wherein (as before I haue largely declared) it maketh a most firme, and strong Articulation, beyng no lesse needfull; for the exceeding great waight that the thighe ought to susteine. Wherefore nature, not acceptyng it sufficient to make a large hole for the entraunce therof, nor inwardly to clothe it with a Cartilage, and in like sorte to augment the borders therof, whereby sufficient come might be offered to the same head, hath prepared likewise a rounde, and strong tyeng, to procede almost from the middle toppe of the same head, and fastened the same agayne in the botome of the acetabule, or cup, as a stable ground, and strong firmament. Which beyng so, their opinions, are accepted by me, which, iudgyng this ioynt neuer plainly lured, do terme it onely a bastard, or false and counterfeit luration, when as (in deede) it is perfect and trew: since it often tymes falleth out, that this Ligament, wherof we last made mention, is relaxed, & slacke, to the great ruine of the member, & difficultie of restitution.

This same bone, immediately after the necke, descendeth with a certaine litle broad portion, out of whiche are carped two Proccesses like knottes, whiche in infantēs hold the nature of Appendances, and may be taken of, though in proccesse of tyme they cleaue so close, and are so rooted in the partes wherein they are prominent, that no signe of Appendance is presented by them. Their seates are (for the most part) on y^e hinder partes, and one higher then an other. The vpper most beyng greater, looketh outward, but y^e neithermost being much lesse, posseth rather y^e inner seate. The greater y^e *Greciās* call *κλυτὸν*: but both are to be named *Τροχαντῆρας*, that is to say *Rotatores*, because they seeme to be ordained for the turnyng, and wheelyng about of the thighe. For they admit the insertion of those Muscles, by whose benefite both the thighe is outward flexed, moued, and carped, as also circumuerted or round turned: yeldyng an apt begynnynge: to the bigg Muscū of bowyng the legges.

In the posterioir part is eminent a certaine lyne, carped from the outer Proccesse to the inner, and as it were ioyning, or tyeng them together: and from hēce begynneth the thighe to take on him the shape and forme of roundenes: whence forward, beyng gone beyond the middle region, the more it descendeth the more also it engroseth, and enlargeth, being inwardly flatter, and at length goeth forth in two great heades, rough on the outside, & altogether bneuen: but their endes, or extreme faces be smooth, couered with a smooth crust, and are constituted, and finally made, by the interuenture of a mighty Appendaunce. In the posterioir part, these heades are deuīd with a great, and large chinke, or hollow space, but before, more lightly depressed with a cōmon cauitie, wherein lyeth the hole, or rotule of the knee.

But as touchyng the seuerall description of these, we cannot affirme one, in fashion like an other: for the innermost is thicker, and the outmost playnly broader, and more depressed, least both should be alike Articulated vnto the legge, for the oblique motion sake: especially whē the legge should be bowd to the exterior partes: to the which motion is destined the Muscū lurking vnder the hāme, whose originall is from this outermost head, towarde the posterioir partes, euē there, whereas it is rough, & impresse with certain litle corners, or cauities.

The composition of the thighe with the legge is called *Cinglymon*, because one mutually receiveth, and is receiued of an other: as the vpper head of *Tibia*, or the bone of the legge, hāving y^e cauities, or hollowes: For the y^e lower heades of the thighe, hath also betwene those two cauities, an eminent portion protuberated, which is also receiued into the posterioir hollow, or gutter of the thighe: from whence floweth a most strong Ligament, to bynde together the thighe with the

L. i.

legge,

How and why
the thigh hath so
stronge articula-
tion.

The Cartilage.

The Ligament.

The error of
those confused
which suppose
this ioynt neuer
playnly to be un-
lured.

How the luration
of y^e ioynt of the
thigh is made
difficūle to re-
store.

Col. Lib. 7. Cap. 19.

The proccesse of
the thigh in new
borne children
seeme appendan-
ces.

The descriptio of
the Proccesses of
the thigh.
Clouton what.

Rotatores what.

The utilitie of the
Proccesses of the
thighe.

How the Procces-
ses of the thigh
are ioynd.

Whence the thigh
is round.

The descriptio of
y^e thigh in length.

The appendaunce.

The chinke or gut-
ter that deuīdeth
the inferioir
heades.

The place for the
rotule of the knee.

The y^e inferioir
heades of y^e thigh
compared toge-
ther.

The legge how it
boweth to y^e out-
side.

The originall of
the muscū vnder
the hāme.

The composition
of the thigh with
the legge is by

Cinglymon, but
with the hippe by

Enathrosis.

How the articula-
tion of y^e thighe
with the legge is
done also with a

Ligament.

The first Booke of the

Wherin the articulation of the hippe is notable from all other ioyntes.

The line in the posterior region of the thigh.

The vse of the line of the thigh.
The greatest muscle in the bodie.
How we purchase straight standing.
The benefit of Asperities in the thigh.
The vse of the thigh.

Why the inner concavities of the thigh is large.

Veines.

Tibia comprehendeth all that space betwene the knee and the foote, called the legge, containing ii. bones, of which the greatest beareth the name.
Tibia and Fibula compared in proportion to Radius and Cubitus.

The names of the lesser bone of the legge.

Appendance.
The description of the superior part of Tibia.

The industrie of nature.

The mouable cartilages of the knee.

The vse of the ii. in the upper part of Tibia.

The mouable cartilage of the knee beareth the roome of a Ligament.

The tubercle of the process betwene the cavities.

How the process of Tibia is in posterior cavity betwene the ii. heades of the thigh.

The legge downward is as it were iiij. square.

legge, in like sorte, as is lately sayd by the knittynge of the thigh, with *Coxendix*. And for this kynde of Articulation, that is to say, so noted with a strong Ligament within the ioynt, as is this thigh, both above, and beneath, beside the outward obductions, and clothynges with Ligamentes, which is also common to other ioyntes, it is odde, and vnlike to all others: and therfore is notable to be spoke of.

Furthermore in this bone of the thigh, is to be noted a certaine euident, and roughe lyne in the posterior region, begynnynge not farre from the innermost of the vpper Processes, called *Rofatores*, and so, on the same region of side, brought downe after the longitude of the thigh: and, beyond the middle, denyng into two partes, or courses, seemeth to reach vnto both the heades, but most apparantly endeth at the outermost. This noble lyne, least you ouer lightly way it, consider, and know how firmly, the right Muscle of the thigh, which is the greatest of all the Muscles in the body, and by whose benefite our straight standing is made, is thereto fixed and knit. There be also diuers other Asperities, and rough partes, not without some impressions, all made for the cause of Muscles seates, insertions, and so forth, as hereafter shalbe more fitte to say how.

By the thigh, we both sit, and stand by right, as also moue towardes euery thyng. For, from the Articulation therof in the hippe, no maner of motion is exempted. The concavities therein, for lightnes and the conseruing of medullous nutriment, is very large: not vnfit for the largenes of the bone. As for Veines, that perforate the substance thereof at either end, let no man doubt of: for besides that they are euident, know that Nature willeth no part in the body to liue without bloud.

And thus this large bone of the thigh endeth, above, at *Coxendix*, and beneath, at *Tibia*: which we call the legge: wherewith although there by another bone ioynted, that is to the side therof, all a long the length of the legge, yet this beareth the name, as it is in dede most notable. For in the legge are two bones, like as is sayd in the cubite: but the one farre greater then the other, and that therfore possesseth the hole name of *Tibia*, or *Crus*. The lesser hath sundry names as *Sura*, *Fibula*, and of the barbarous sort, *Focile minus*.

This *Tibia* is clothed with an Appendance at either end: but the superior part therof is both broader, and also thicker, hauing in the toppe, two cavities lightly exculp'd: betwene which, riseth a prominent, and rough tubercle, as I touched euen now, in describing the Articulation of the thigh with the legge. Those cavities admit the heades of the thigh: wherin Nature well foreseeing, hath provided, least for the quantitie of the heades the cavities should be to much depressed. Therfore besides the common Cartilage, wherewith either of them are incrusted, nature aloft hath layd another, mouable, and soft, representynge the figure of the *Q*uone or the similitude of this letter *C*. About the borders thereof the same is thicker, but the more towardes the centre or middle, the thinner: & endynge first before, it toucheth the centre: thus the profunditie of the cavities of *Tibia*, are left sufficient great. Wherefore chiefly it seemeth this Cartilage, for that purpose to haue bene ordained. Which as it is light, soft, and vinctuous, or full of humiditie: so doth it serue as the turne of a Ligament, and much auayle to the actiue moning of the ioynte. Likewise that bunched, or protuberant part, that emergeth from betwene those cavities exculp'd (as aforesayd) in the vpper extremitie of *Tibia*, maketh not a litle, to the confirmation of this ioynt by being immittid into that large cavity of the thigh: and not onely so, but also bounde thereto by a strong Ligament proceeding from the toppe of the same knot, or tubercle: and thus strongly is this ioynt armed, and holden in on ech side.

After, proceeding downward from the superior part of the legge, we finde the same here, and there, attenuated, and lighted with long lynes, and flatted sides,

sides, in such sort, as that the whole proportion betwene the *ij.* heades, or endes therof, is (as it were) *ij.* square, obliquely stretching and incurvated principally in *ij.* places: easely giuing place to the Muscles thether dissendyng. But on the outside towardes the hinder partes, there lyeth a certaine light cauitie spread ouer with a Cartilage, whereto leaneth the inner part of the head of *Fibula*, and so in the vpper part it is ioyned with *Tibia*. From the middle toppe of the posterioir part therof, is drawne out a decliued, or crooked cauitie, for the transiture of a Veyne, Arterie, and Sinew, which that way downewardes are intrinched, to do (as others) that they owe to the lower partes.

And in the fore face, and vpper part, not farre from the end of the Appēdance whiche is sayd to be so largely plated vpon the toppe of the legge, is a certaine rough eminence, admittynge the insertion of Muscles, such as extend and stretch forth the legge. From whence, all after the middle region, is produced a sharpe line comparable to the ridge of any thyng: wherfore of some it is so named.

And this inner syde of the legge is the part we call the shinne, accompted to be without flesh, whereas all others, and chiefly the posterioir part is opplet, and filled with much stoepe of flesh.

The second line which lieth vnder *Fibula*, directly towardes it, is made, to the end that there hence might a Ligament be produced, whereby *Fibula* is with *Tibia* connected, and knit: and (like as is sayd in the cubit) the anterior, from the posterioir Muscles are thereby distinguished.

Agayne the inferior part of *Tibia* towardes the end wareth also thicker, but the head therof, lesse then that in the superior part, and the extreme end excised, and cut into one onely large concavities, which is not frustrate of the benefite of a Cartilage: wherunto is admitted the insertion of the bone *Talus*. The inner side of this neither head of *Tibia* goeth forth like a thicke Proesse, ouerreachyng on that syde the late sayd cauitie: by reason whereof, *Talus* seemeth as though it were vnder set, on that side, for slipping cut.

Contrarywise the other side, not beyng able to yeld the like, for that it behooued it rather to offer a long hollowed corner wherein to lodge the lower part of *Fibula*: and agayne, since it were aswell expedient for that side to be defended fro each light luxatio as the other: see the deuise of nature, in stretchyng forth the head of *Fibula*, as farre beyond the head of *Tibia* in this lower part, as vpiward the legge surmounteth it in longitude: wherby is fulfilled in it, that whiche might not be one that side brought to passe in *Tibia*. For here it becommeth as answerable to the outside of *Talus*, as the Proesse one the inner side extended from *Tibia*. These are they which commonly in our English phrase we call the Ancles. The Proesse of *Tibia* being the inner ancle, and the outer head of *Fibula*, these *ij.* make strong resistance, least *Talus* to *Tibia* articulated should on any side slippe fro his seate. But when such luxation hapneth at any tyme, we see it more comonly to the inner side, then the outer side: because the outer is longer produced then the inner.

Moreover that Proesse of *Tibia* which we call the inner ancle, in the posterioir part therof, hath a cauitie, whence is extract a Ligament, wherewith *Talus* to *Tibia* besides is alligated, and bounde. And further, that this knittynge might be more firme, no small ayde yeldeth that litle long and rough corner, transuersly caried, whiche the Anterior seate of the Appendance of this inferior head of *Tibia* putteth forth: for hereto springeth a Ligament knittynge the necke of *Talus* to *Tibia*.

But here you must vnderstand, that the ioyning of *Fibula* with the legge is after no other order, then as we haue declared before, in the knittynge (in the arme) of *Radius* with *Cubitus*: yet ascendeth not so high, as that it any thyng at all toucheth the bone of the thigh: and downewardes contrarywise, descendeth lower then

Why the legge is crooked principally in these places.

Fibula how it is ioyned to the legge. The cauitie receiuing the vessels.

The insertion of the Muscles that extend the legge. The spine of the legge.

What is called the shinne.

The use of the second line in *Tibia*.

The description of the intricate parte of *Tibia*.

The use of the inner Proesse of the neither head of *Tibia*.

See the manner how nature

Col. Lib. 1. Cap. 30. The *ij.* ancles which be they.

Why location of the foot rather inclineth to the inner ancle then to the outer.

The figure and use of the inner ancle.

The neck of *Talus* is knit to *Tibia*.

Fibula toucheth not the thigh above.

Arthrodia vnder *sinuatio*.

The first Booke of the

the legge, for what end and vse, we haue sayd: ech structure, and combynation therof, being by *Arthroia*, vnder *Synarthrosis*.

Both the heades of *Fibula* stretch forth into a sharpe Procelle, endewd, and shaped with certaine roughnes, to the vppermost of which, being more round, are inserted the Muscles mouing the legge, but the inferiour, which is more depressed and also outwardly more Gibbous, sendeth forth Muscles seruyng to the extreme part of the foote. And both these heades, insomuch as they are receiued into there proper cauities, are clothed with a Cartilage.

To speake therfore wholly of this same *Fibula*, the small bone of the legge, although it be straight, or at least but a litle crooked, yet a great space of it departeth from the same *Tibia*, but farthest of all in the superiour region therof: because there also *Tibia* is more hollow flected, then in the whole space besides.

And in this distaunce, may you discern the Ligament lately spoken of, completyng together the legge and *Fibula*, in the middle space, and separatyng the Muscles, by which, those spaces of the legge on eche side are fulfilled: to whose insertions, and situations, much seruiceable is the inequality of *Fibula*, ensigned so with apt cauities, and lines, whereby it is in like sorte trianguled, or thre squared: & as *Tibia* receybeth a safe roome for the marey, so *Fibula* wanteth not wher in to cary this nourishment.

In the fore part of the knee, at the ioyning together, or coarticulation of the legge with the thigh, is a certayne bone deuised from them both, yet not refusing service, but is common to ether of them: and called of the latines diuersly: as *Patella*, *genu mola*, *scutiforme os*, and *Rotula genu*, in English the Patell, the Rotule of the knee, the shieldlike bone, the eye of the knee. &c. the substance therof is not Cartilaginous as some haue thought good, neither yet altogether hard, and Solid, as others would affirme, but rather as it were the substance of some hard Appendance: to the end it might be apt to receiue nourishment into all the partes therof. Notwithstanding that, it is inuolued, and wrapped about with a slippery Cartilage, especially on the side towards the thighe and legge, the other as clothed with the tendons of Muscles. This Patell was ordained to couer the ioynt betwene the thighe and legge, which otherwise had bene to open, and prone to be lured forward. It yeldeth also that the knee might directly be bowed to a corner. So it ought to be mouable, and not stubburnly cleauyng, for makyng the motion hereof difficulte, but with his Ligamentes, and those of the thighe, it is knit vnto the legge though others say it is onely holden thereto by the tendons of Muscles. For from the Appendances of the thigh, and legge, arise Ligamentes, wherewith manifestly the Patell is bound on eche side, but to the thigh it is Articulated by *Ginglymon*. For the inferiour part of the thigh hauing two heades, as I haue sayd, leaueth the middest a hollow corner, into which the middle protuberant part of the Patell is immitted: which, that it might the better fulfill, and more commodiously cleaue vnto it, it is here and there noted with cauities, answerable to the protuberant portions of the head of y thighe, wherfore accordyng to that kynde of Articulation named, the Patell both receiue, and is receiued of the thigh, the fashion therof is almost round, goyng out somewhat sharpe (as it were) where it sitteth to the legge, & therfore it obtaineth the name of a shield. In the sides or extreme partes it is more light, and thynne, but the more nearer the middest the thicker, and bosseth out the more evidently. It preuenteth an incommoditie (sayth Galen) least in bowyng the knee, the thigh should slippe over the cauities in the toppes of *Tibia*. And not meanelly stayeth vs from falling whilest we descend downe some hill, or crooked place: when as the whole body beside is wayed backward. And thus much of the superiour members.

Now

The vses of the
asperities of the
Procelles of *Fibula*.

Cartilage to *Fibula*.

The distaunce be-
twene *Tibia* & *Fibula*,
and why.

The lines and
inequality of *Fibula*
to what vse.
Their inward
hollownes.
The wheribone
of the knee is com-
mon in vse both
to the thigh and
legge.
The explanation
of the names of
this bone.
The substance of
the rotule of the
knee.

Col. Cap. 31.
Why the rotule of
the knee is not
solid.
Where it is lap-
ped in a slippery
Cartilage.
The best vtilitie
of the Rotule.
Why it is in-
uolued.
The Rotule hath
his proper liga-
mentes agaynst
the common opi-
nion.
The risinge of
his proper liga-
mentes from
whence.

The Patell is ar-
ticulated to the
thigh by *Ginglymo*.

The figure of the
patell what kind
of one.

Where the Patell
is thickest, and
bowed forth like
the middest of a
buckler.

The notable vse
of this Patell
bone or Rotule of
the knee.
Lib. 3. de Vi. part.
Cap. 15.

Now it resteth to speake of the bones appertaining to the foote; and wherof the foote is effourmed and made: The number of them is xxij. obſcruping iij. orders in the foote, lyke as in the hand. For, the first part, which immediately ſuccedeth the legge and *Fibula*, being called *Tarsus*, is aunſwerable to the wzeſt of the hand. The ſecond, called *Pedum*, is comparable to the *Postbrachiall* bones. The thyzd order is deſtined to the ioyntes of the fingers. Onely this difference is betwene them: that the bones of *Tarsus* are but vij. in number, and they of the wzeſt are vij. wherby it hapneth that the hand ſurmounteth the foote by one in number, but to *Pedum* are v. belonging, as many as are numbred of the *Postbrachiall* bones, the other iij. are deuided among the ioyntes of the fingers, as well in the foote, as the hand.

Neithr (ſayth *Collumbus*) do I ſee, why from the bones of *Tarsus* the thze first ſhould be diſioyned, as other Anathomistes haue thought good, grauntyng that the iij. laſt bones, whiche alone (ſay they) merite the name of *Tarsus*, ought onely to be compared to the wzeſt, without mention of the other ij. The therefore thinketh good to complect both thoſe ij. as alſo the other ſoure followyng vnder the name of *Tarsus*: as when we depart from *Tibia*, and *Sura*, deſcending, forthwith we come vnto one maner of ioyning together of bones, as it were a naue, which we compare vnto the wzeſt followyng *Cubitus* and *Ulna*. But euery one of theſe bones belongyng to *Tarsus*, haue not peculiar names given the: for the first thze are of ſome (in their diuiſion) remoued from *Tarsus*, and one of the ſoure followyng obtaineth a propper name, but the thze laſt are hether to altogether vnnamed. The first of all therefore is named *Talus*, the ſecond *Calx*, the thyzd *Scaphoides*, the iij. *Cyboides*, the other ij, although they go vnnamed, yet by number, ſourme, and ſituation they are diſtinguiſhed.

And now to deſcribe them all in order, *Talus* being first, proſtrated vnder *Tibia*, and *Fibula*, and ſubiect to their Appēdances, although it ſeeme onely ſubſtrated to *Tibia*, is in ſourme bolſyng out aboute lyke a round heaued, or ſwelled thing, imitatyng in compaſſe the faſhion of halfe a wheele, or if I may to liken it to the wheele of a pulley: for in the middelt it is guttured, or hollowed, though not ſo deepe, but lightly, ſo that the ſides onely maie be diſcerned higher wherby it is coupled with the bone of the legge. For the Appēdancē therof is ſo for the purpoſe engrauen, to admit this head of *Talus* into his ſit ſeate, after the kynde of articulation called *Ginglymon*. And this maner of the ioynt ſerueth to the bolwyng, and reſectyng of the foote: the which motion ech walkyng creature continually maketh: which, to the end it might be made moze eaſie, and with leſſe labour to y member, or leſt the bones by much weaering, ſhould be waſted, either part, both of *Tarsus* and *Talus*, are plentyfully encruſted with an Appēdancē, perpetually to endure the foetes inceſſant motion. *Talus* is on eche ſide declined, and as it were cōpreſſed, where the Ancles are placed, neither yet without the ouer ſpreading, or deſſenſiue clothyng of a Cartilage, although not on ech ſide of like ſort. For the inner ſide is onely cōpreſſed aboute in ſmal ſcope and amplitude, becauſe the Proceſſe of the inferiour Appēdancē of *Tibia* conſtitutyng the inner ancle, and comprehendyng this ſide of *Talus*, is not in ſuch ample ſpace, encruſted with a Cartilage: but the outer ſide of *Talus* is largely ſinuuated, & in greater ſpace bearyng the obduation of a Cartilage, to the apt conſtitutyng of a ſeate congruent to the inner ſide of the lower Appēdancē of *Fibula*, which maketh the outer Ancle: and diſcendyng lower then the inner, the inferiour part of *Talus* is hollow, & clothed with a Cartilage, and lyeng wholly vpon the face of the heele bone: but ſo not withſtandyng, as that the ſame obtaineth a half compaſſed cavitie: which admitteth the middle regiō of y heele bone thereunto preaſſing, & accoꝝdynly ſourmed. And as the interior ſide of the inner Ankle poſſelleth a rough cavitie, out of

L. iij.

which

The number of the bones in the foote 16. one leſſe then in y hand. Three orders of bones in y foote.

The iij. orders of bones in the foote are 1. imputed to the iij. orders of bones in y hand. The difference betwene the bones of the hand and of the foote.

The number of the bones to *Tarsus* 16.

The number of bones to *Pedum*. The bones of the fingers both of foote and hand are 11.

Col. Cap. 32. Why in y bones of *Talus* Col. diſſereth from other Anathomistes.

Talus. *Calx*. *Scaphoides*. *Cyboides*.

The deſcription of *Talus*.

Talus to *Tibia* articulated by *Ginglymon*.

The uſe of the articulation to the foote.

The uſe of the cartilage to *Talus*.

The ſides of *Talus* declined & cūen.

What conſtituteth the inner ancle.

The inferior part of *Talus*.

Vesal. Lib. 1. cap. 33.

The first Booke of the

How Talus is bound to the ankles.
The use of the asperities in Talus.

The use of the cavities in Talus.

The figure and use of the anterior part of Talus.
Col. Lib. 1. Cap. 32.

How the foot is by obscure motions is moved.

What is under the foot by the anterior and posterior part.

The use of the large cavity in Talus.
The description of the fore part of Talus.

The substance of the bone Talus.
The error of those that esteem the bone Talus to be solid.

The hēle bone remains thereof.
The magnitude.
The substance.
The description of the upper part of the hēle bone where it is committed to Talus.

The articulation of Calc with Talus is by Ginglymon.

The description of the first part of the hēle.

Why the hēle backward exceeds the certitude of the legge.

Why the inferior part of the hēle bone is broader.
Why it is rough having a transverse Proccesse.

A Musculous matter whence the Muscles spring.

which springeth a Cartilaginous Ligament, for the binding together of *Talus*, and *Tibia*: euen so, for the receiuing of the same Ligament, the inner side of *Talus* hath a rough cavitie, or hollow, euen as the outer side thereof is likewise hollowly engrauen, that thereto might be inserted the Ligament brought from the inner side of the outer Ankle. For the like cause also is the hinder part of *Talus*, about the roote thereof rough, to admit and receiue the Ligamentes whose begynnings are in *Tibia*, reaching others to the hēle. But besides this sayd asperitie or roughnes, the posterioir seat of *Talus* sheweth also hollow or concealed places to the tendons of Muscles that are caried to the foote, and goe vnder the inferiour partes thereof. And in this manner is *Talus* articulated to *Tibia*, as also, the superiour posterioir partes and sides, are fourmed as is sayd. The Anterior part of *Talus* stretcheth forth his portion like a necke, whiche endeth at a round head, not destitute of his crusty couer, whiche is admitted into the large, and rounde sinuated side of the Boatelike Bone: by the benefite of the whiche ioynte, the foote (although obscurely) moueth outward, and inward, as also doth as (it were) somewhat turne about. But in the posterioir part it is after a maner prominent, that is, where it is receiued of the inner and posterioir part of the hēle. We call that the posterioir part, which, descendyng down from the head, first offeth it selfe vnto vs: and that further fro the remoued, the posterioir. But in yⁿferiour part on the outside of *Talus* is a profound cavitie, augmented by an answerable cavitie on the same side of the hēle bone. In this cavitie is contained a certaine murous, or slimie substance, together with fatnes, so prepared to the moystnyng & annoynting of those bones: lest els much mouing should drie them, and they dyed, consequently their office frustrate. Finally *Talus* lyeth downe in the fore part, and is extended vpon the hēle bone, as it were into a double Proccesse, that is to say, where it respecteth the inner region. And thus is shewed the first bone called *Talus*, which (notwithstanding) is likewise so sinuated, and hollowed, as not onely it admitteth the insertion or rising rather of Ligamentes, but also aptly giueth place to the tendons of Muscles, brought thither for the moyning of the toes as is aforesayd: onely this more we haue to say, that the substance thereof meriteth nothyng lesse then to be called Solid, for asmuch as (though contrary to the opinions of some) we finde it spongie, and replete with many holes.

The second bone in order ensuyng is called the hēle, or hēle bone, or of others the Spurre of the foote. In magnitude it farre excēdeth all others of the foote, neither differing in substance much from *Talus*, vnlesse it seeme somewhat more fungous, and not with so hard a crust munit. A loft, it is committed to *Talus* in manner aforesayd: that is to say the middle region towardes the fore partes swelling round, hath also more forward a great cavitie to receiue *Talus*, so that one receiuyng an other, the maner of Articulation is, called *Ginglymon*. But notwithstanding the first part of the hēle tendeth backwardes, beyng somewhat lōg, and round, with a head as it were in the outer side thereof: in that region neither neglectyng his propper Appendaunce, but departyng wholly from the straight lyne, or rectitude of *Tibia*, lest the foote, together with the legge in going, should haue bene ouer prompt to slide backward to the no small vncertaintie in goyng, and setting the foote to the ground. The inferiour part of the hēle bone, where by we tread, and go forwardes, was requisite to be somewhat broad, for the safer setting of the foote. As also to be rough, and endewed with a transuerse Proccesse, that thence might haue his beyng the Muscle, that serueth to bolue the fourth ioynt of the toes. Where beside springeth that Musculous matter, whence the foure Muscles proccede, which with a long tendon, be implanted to the interne region of foure toes, and therefore by these eminent Proccesses is left a certaine cavitie, or hollow place, wherein more fitly might lye both that Muscle, and Musculous

culous substance, lest that the foote being strongly set to the ground, the heades of the same Muscles might be, by too much compression, offended. Now also the hēle, in that part which is sayd to go forth backwardes in fourme of a head, with a certaine flatnes, is also lightly made rough: for the more fit, and easie insertiō of that tendon, of all others the greatest, and strongest, which is made by the conioynng of the iij. Muscles, moving the foote, in one. In that part whiche is towardes the litle toe, this bone is ioyned with that called *Cyboides*: and so in dede the maner of his Articulation is supposed most rightly to be *Ginglymon* referred vnder *Synarthrosis*. Agayne where it respecteth the greatest finger (which part notwithstanding seemeth more rightly to be accompted the inner syde of the hēle bone) it sendeth out no small Proesse, which is augmented by the hollow in the inner side engrauen, and for that cause was ordayned as a proper propugnacle, both to the tendons of Muscles, as also to the Veyne, Arterie, and Nerue thereby passing. Neither for any other consideration was that side so notably excaued and hollowed, then to giue place to these vessels, and tendons: to all which aswell this same Proesse is profitable, as requisite also for the fit setting to of *Talus* with the hēle bone. In fine, the outer side of the hēle is depressed, rough, and vnequall: hauing neare to the posterioir part, a litle cavitie fossied vnder a small Proesse: and herein resteth a Cartilaginous crust, bisited by the tendon of the vii. Muscle seruing to the extension of the foote.

The third bone, called the thypplike, or boatelike bone, because it somewhat nearely toucheth the shape or fashion of a boate, is put next in the inside of the foote: in whose former seate is insculped a deepe cavitie, wherein the round head of *Talus* is settled, and this Articulation is put most meetely vnder *Enarthrosis*, because in it (but very obscurely) no motiō is sene. The posterioir part thereof is committed to the first seate of the fist, list, and seneth bones without names, and that in such sort, as it is not easie to iudge whether it receineth, or is receiued of those bones. But notwithstanding that some obscuritie must needs be graunted (here reuerence being added) I haue hetherto obserued the Articulation thereof with lesse obscuritie. For although the vii. bone seemeth neither to receiue, nor to be receiued, (yet rather receiued) by vii. (notwithstanding) not very obscurely admitteth, and the fist to all mens eyes, more evidently is hollow, and excaued. And as touching the outer side, it is round, large, and sinuated where it is ioyned with the vii. bone: but thence (on the inside) as it departeth, it gathereth by litle and litle to the fashion of a corner, and inwardly endyng with a Proesse, like the neb of a thyppe or boate: and so prominent is the inner side, as that it maketh a notable bone, or round encreasing, by meanes wherof the right, from the left, is easely distinguished, and knotone. And thereby is the cavitie vnderneath made greater, by the goyng forth of this part thereof: wherein is fittely reflected the tendon of the vii. Muscle moving the foote. The roughnes of this same bone is not resided in some one part onely, but abundant ech where, both aboue & beneath for the fast placing of Ligamentes, as behoued to the coniectyng & knitting together of these Bones.

The fourth is *Cyboides*, or after the Latins *Cubeforme* or, as it were squared lyke a bye: yet is it not so, but rather made after a straunge and diuers fourme: and therefore *πολυμορφον* most rightly it is named, as a thynge diuersly fourmed. It sitteth in the outside of the foote, and in the fore part, is ioyned in that order with the hēle bone, as it seemeth no more to receiue, then thereof to be receiued. In the posterioir part of it, there be y. as it were cavitie evident, to receiue the endes of the outer bones of *Pedum*, thereto roted, as their ground and foundation. But to speake of the inside thereof, that is coherent with the outside of the senenth bone, on which side, no otherwise then in eche place where it is coupled with other bones, it is lightly incrusted with a Cartilage: but in no place els: lest

L. iij.

by

The asperitie in the head of the hēle and the vñ therof.

How *Talus* is articulated with *Cyboides*.

A Proesse and the vñ therof.

Why the inside of the hēle is so notably excaued.

The outside of the hēle described.

The insertion of the 7. muscles extending the foote.

The 3. bone of the foote called *Scaphoides*, and *Naviforme* in English the thypplike or boatelike bone. The situation of the boatelike bone.

The articulation of the boatelike bone with *Talus* by *Enarthrosis*.

The description of the posterioir part of the boatelike bone.

Col. libid.

The description of the outside of the boatelike bone.

The description of the inner side of the boatelike bone.

The reflexion of the tendon of the 5. muscle moving the foote.

The asperitie of this third bone and vñ thereof.

The fourth bone called *Cyboides*.

Cyboides is nothing lesse then square.

Why *Cyboides* is called *Polimorphon*.

The situation of *Cyboides*.

The description of the posterioir part of the 4. bone.

The inside of *Cyboides*.

The first Booke of the

The outside of Cyboides.

The cauitie pel-
ding way to the
tendons of the 7.
Muscle moving
the foote.

The upper part of
Cyboides.

The fourth and
use of the inferiour
part of the foote.

The figure of the
foote is hollow
vnderneath and
bunched aloft.

5.
The description of
the first bone of
the foote.

Col. Ibid.
The bones of the
second part of the
foote called pedum
are comparable
to the postbrachiall
bones of the hand,
which word I
therfore use here
for the more reedie
phrase of speche.
Not it well.

The articulation
called Gliche.
Playne to playne,
or hollow to pro-
tuberated partes
are committed
not contrariwise.
Why the inferi-
our parte of the first
bone is thicker.

6.
The description of
the vi. bone of
Tarsus vnnamed.
The vi. bone com-
pared to a wedge.

The vniuersal ac-
tuation of the
6. bone.

The situation of
the 7. vnnamed
bone.

Epilogue.

The substance of
the bones of Tar-
sus.

by ouermuch loading of the bones, their motion (whiche at all is but obscure) might be resisted. Further, the extreme side of this bone is as it were forked, & going forth with two Processeles, distinguished with a hollow cauitie running betwene them, stretchyng obliquely as a gutter after the inferiour partes of the same bone: beeyng the perfect way for the course of the vii. Muscle, his tendon moving the foote. The superiour part is playner, and outwardly declined, for so is the fashion of the rest of the foote: that is to say, in the middell most elated, and vpiwardes heaved, agayne, declining by litle and litle towarde each side, but most towarde this outside. And this manner of fourme in the foote, to be adone conuered or embossed round, and beneath contained or hollow, is not onely prouidently prouided of nature, for the stronger construction, and suer (setting the foote to the earth) (which is so notable, as may not be neglected) but also that the passage of the tendons and Muscles vnderneath the foote, might be more perfect, and voyde of offence. The other bones of *Tarsus*, which yet remaine vnspoke of, are iij. in number namelesse.

Of which, the first is sited in that part of the foote ouer agaynst the great toe. It is in the fore part hollowed, the rather to be ioyned with the hinder parte of the boatelike bone: but in the hinder part, maketh a seate for the first of the *Postbrachiall* bones of the foote, that susteineth the great toe: which part (sayth *Collumbus*) is hard to be iudged, whether it be sinuated, or prominent, yet sure it is in some playne inough prominent, & receiued of the first *Postbrachiall* bone. Albeit this case seemeth commo to these foure last bones of *Tarsus*, that their cauities in the sides where they ioyne, are most obscure, & lest euident of all others: committed therfore together by Glene, or at least they may seeme so: but a litle afterwarde *Collumbus* most properly describeth that same end of the first *Postbrachiall*, to haue a double cauitie, and consequently the first bone a double tubercle. For els it wold be a test, to affirme one cauitie to be vnto an other cauitie committed, or contrariwise. The vpper part of this bone is very narrow, and descendeth after the inside which is broadest. And this part is after a sort Gibbous, by reason of that cauitie that is to be discerned in the outer region therof: whilist the inside in the vpper part of it, falleth to the side of the vi. bone with a small kynde of cauitie: yet the inferiour part of this bone is more thicke, that more firmly it might set to the ground.

The vi. bone is iij. squared, if we marke the vpper face therof: whiche as it is playne, so proffering iij. corners. But the inferiour part therof is most narrow, and as it were edged, very properly compared to a wedge, and so the vii. bone which is next to it. But the Anterior part of this vi. bone with the boatelike bone, the hinder part (lightly prominent) with the second of the bones compared to the *Postbrachiall*, the inside with the outer of the v. & the outer side with the inside of the vii. is ioyned: whiche partes neither are they frustrate of the Cartilaginous crustes. The vii. is in the middell betwene the vi. and iij. called *Cyboides*, this seemeth also iij. squared: but with a head somewhat longer then the vi. The fore part resteth vpon the boatelike bone, whose shallow sinuated side admitteth the small tubercle that this sheweth forth: but the hinder part of it admitteth the iij. *Postbrachiall* bone: the sides are attingent to the sides of the vi. and iij. bones. Whether, to of the bones of *Tarsus*: which are in number viij. constitutyng the halfe length of the foote, accomptyng from the extreme poynt of the heele, and so forthward (all which space may be accompted the *Brachiall*, or wrist bones) to the bones susteinynge the toes, aunswerable to the *Postbrachiall* bones of the hand. As touchyng their substance although they be hard, yet not altogether Solid, but yeldyng way for nourishment as behoueth such bones.

Now follow the Bones aunswerable to the Backe of the hand, heretofore mentioned, beeyng the second part of the foote, called of the Latins *Plantæ*.

or *Vestigium*, as it were the footsteppe, hold, or chief gard of the pace: consisting of five Bones, long, and round, imitatyng the ioyntes of the fingers, the greatness of whose extreme heades, leaue the middle partes much more light, and slender. For their begynnynge are grosse, and sinuated, where they are compounded with the *iiiij*. last Bones of *Tarsus*, in manner as before is declared. But where they meete with the first ioyntes of the Toes, they swell forth in rounded heades, like as the *Postbrachiall* bones of the hand where they are set to the fingers. The greatest of these in thickness is the first, although in length it giueth place to the rest, that is, of all the other it is shortest, and of all others therewith the thickest: the inferiour part wherof, which is vnder the Anterior head, putteth forth a tubercle, wherewith it separateth the *v*. Sesamine Ossicles there resident, whereto is inserted the senith Muscle mouyng the foote. And the posterior part also is beneth prominent, whiche in mouyng the great Toe (comparable to the thombe) runneth into the diuision of the two Sesamine Bones, wherof we speake more anon.

Euen so the last bone susteinynge the litle toe, where it is coupled with *Cyboides* hath a notable Proesse, goyng forth on the outside of the foote, whiche, augmentyng so the length of the same bone, maketh it comparable to the longest: which els had bene that bone that susteineth the second toe of the foote, that is, that next the great toe. The which Proesse, lest it might be thought to serue for no other purpose, note that to it is inserted the tendon of the *vij*. Muscle of the foote, as more at large in the history of Muscles is declared.

Briefly all these bones, in their fore partes, are vnited to the bones of *Tarsus*, as also mutually inherent one with an other, but further in their progresse they are a sunder by litle and litle denided, becommynge more slender, for the constitutyng of sufficient spaces betwene them, for the more lodgyng of the Muscles seruyng to bowe the first ioyntes of the Toes, accordyngly as I also touched in the description of the *Postbrachiall* bones of the hand.

Appendances are appertinent both to their Anterior, and posterior partes, Cristelly couered: but in their posterior partes the heades of these Bones are fourmed round, which are committed accordyngly, to the deepe cauities of the first ioyntes of the toes. Vnto are these within, and replenished with marcy, neither haue they not litle holes, by which, both surcles of Veynes & Arteries with nourishment, make entraunce.

The third part of the foote, the Toes, representyng fingers, do supply: followyng the *Postbrachiall* bones. The number of them is *iiiiij*. in euery toe *ij*. except the great toe or thombe, whiche hath onely two as is also in the hand to be obserued. For that which should be the first ioynt of the great toe (like as Galen in the *Postbrachiall* Bones of the hand, accompteth that to be the first ioynt of the thombe, which *Collumbus* (contrarily) affirmeth the first bone of *Postbrachiale*) is reckned amongst the bones of the *Planta* last spoken of, & that with greater perspicuitie then in the hand: whose motion there is manifest, but here as obscure as the rest of that accompt.

And euen as the number of the bones of the toes in the foote, are agreable to those of the hand, so likewise they are litle different in substance, construction, and situation: saue that in the foote, the Anterior partes of the first ioyntes haue deeper concauities, for the couchyng in of the greater swelled heades of the bones of the *Plante*, which kinde of Articulation is called *Enarthrosis*, but euery of their mutuall Articulations, *Ginglymon*. The space betwene the knots of the ioyntes in the foote, are shorter then in the hand, and round bunched aboue, but beneth hollow, and sinuous, for the safe admittance of the tendons of Muscles seruyng to bowe the second, and third ioynts of the toes. As for Appendances, euery of their

The plant or middle part of the foote answerable to the middle or postbrachial bones of the hand.

Number.
Figure.
Etiographe.
The description of the first bone of the plante.
The use of the tubercle of the first bone in the fore parte.
Fuch. Lib. 1. Cap. 37.

The Proesse of his posterior parte.
The description of the last bone of the plante susteinynge the litle toe.
Fuch. ibidem.
The use of the proesse of the last bone of the plante.
The insertion of the *vij*. muscle of the foote.

Col. Lib. 1. Cap. 34.
The use of the slenderes in the middle of these bones.

The situation of the Muscles seruyng to bow the first ioynt of the toes.

Appendance.
Marcy.
Veynes.
Arteries.

3.
The toes are the 3. part of the foote.
The number of the bones of the toes.
The thombe hath 2. ioyntes in the hand and foote.
A Collation of the bones of the toes with the bones of the fingers.

Where the bones of the toes be articulated with the bones of the plante by *Enarthrosis*.

What is *Enarthrosis*.

The mutuall Articulation of the bones of the plante and toes is done by *Ginglymon*.

The first Booke of the

The benefit of
Cartilage in Arti-
culation.

Why the extre-
mities of y^e toes
haue neither ap-
pendance nor
Cartilage.
Marey.

The situation and
figure of the Se-
samine bones.
The vse of the
Sesamine bones

Their substance.
Medullous myce
confered in the
sesamines.

Why they are cal-
led sesamina.
Why Location
in the toes is
sometime hard to
be reposed.

The number of
the Sesamine
bones is vncer-
taine.

The difference of
ij. Sesamine
bones from the
rest.

Fuch. Cap. 37.
The diuinitie
comment of Ma-
gicians.

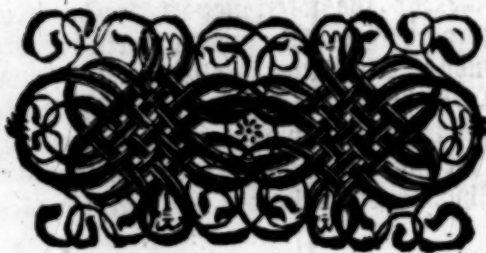
heades tast of their benefite, with the slippery clothynge of Cartilages, for Articulation, and motion sake, exceptyng the extremities of the toes: where is neither Appendance, nor Cartilaginous crust to be inuented: for that to no other Bones they are coarticulated, and knit. Their substance (inwardly) is endewed with fit cauities, for the conseruation of Olie nourishment, wherewith they are filled.

Thus is finished the last parte of the foote, but before I altogether cease to speake of bones, accordyng as I haue heretofore promised, the small Officles, or Sesamine bones shall occupy a litle space of tyme, least (peraduenture) they be deemed forgotten: which crime, in this discourse, I would not be accused of. Under the ioyntes therfore of the fingers, aswell of y^e handes, as fete, are litle round bones, which although they were created of nature to fulfill the boyde places, left to those ioyntes where they growe, yet serue they to other farre greater vses: beyng no otherwise, as propugnacles to the ioyntes, then the rotule of the knee for the defence of that region: not a litle also strengthnyng the ioyntes to the apprehendyng, and holdyng of any thyng, and in the foote, to the equall passing one the ground. So also, that the ioynt in bowing, should not yeld to sharpe a corner, they are in substance almost Solid, yet within replete with pores, to conserue y^e iuyce of medullous nutriment. They are called *Sesamina Officula* for their litenes, and likenes to the Sesamine seede, these make sometyme the first ioyntes of the toes being lurated, hard to be rightly restored but by a skilful Artist who knoweth the reason of such difficultie. The number of them is not certaine, sometyme x. sometyme xv. and in some xx. but in aged persons more great, & notable. Inough differēt also are those ij. reposed vnder the first bone of *Planta* where it is Articulated vnto the first ioynte of the great toe, where they cleaue, and are much greater then all others, yet the inner of these excēdeth the other in largenes. Which the followers of hiddē, and Philosophicall misteries, haue affirmed subiect to no corruption: feinyng that it is kept in the earth vntill the day of resurrection, when, as a seede it shall spyng, and renew the body agayne,

So that I perceiue the godly Martyrs, whose bodies, for the profes-

sion of Christ haue bene burnt to death, shall neuer rise agayne.
for well I am assured, that what seede soeuer is once confound-
ed by the force of that element, the same shall no where
after be found to take roote: which doctrine, together
with the Doctors, is to be shunned, and dete-
sted of all true beleuers of Christ, his death,
and resurrection. But here of the descrip-
tion of the Bodies frame worke, the
glasse is runne and other partes
require to be spoken of.

An end of the Historie of Bones.





The second Booke of the Historie Man, discoursing the Cartilages.

The description of
a Cartilage.
Collumbus. Lib. 2.
Cap. 11.

It behoued not a
cartilage to haue
sense.
The sundry uses
of Cartilages.

Nature marue-
lous in creating
the Cartilages.



Cartilage is a Substaunce, meane betwixt the bone and the Ligament, beyng so much the more softer then the Bone, by how much agayne it is harder then the Ligament. In whitenes it agreeth with them both, and of sense wholly destitute: for so it was requisite, whether they be placed in the office of susteyning & enclosing, or serue in steade of propugnacles: els preuent the wearing of bones by mouyng: or make that they cleaue together more firmly: or augment concavities: or yeld to eche action more facilitie. And so hath Nature disposed their substaunciall properties, as by yeldyng eche where with their softenes, they may not be broken, in that they resiste not, as the bones, nei-

ther do they slippe away by any force, or be extended by Attraction, as doe the Ligamentes for the most part: but alway returning to them selues, are not soone displaced, nor easely chaunged in forme. But because I purpose to speake of them more particularly, as tofoze I haue trauced in the bones, it should seme superfluous to speake more of their properties, sithens to what end they were created eche one shall declare it selfe.

Wherefoze to begyn with the first, it should seme most worthy that the Cartilages of the eye lyddes be no longer deferred, which are in number as many, as the very lyddes of the eyes, that is two to either eye, one aboue, which in me, and such creatures as onely moue the vpper lyddes, are greater then the neither: but in others, as byrdes, the nether excede the vppermost in quantitie.

These Cartilages are situated to the extreme borders of the eye lyddes, clothed within with a Membran, and without with skinnie. Their situation thus in the extremities for great consideration was ordeyned of Nature. For more straitly by them are the eyes hable to winck and close together, proseruyng them selues likewise as propugnacles to the eyes by the susteyning of heares vnto them. Which by their meanes are stidly supported, & not slackyngly or losely bozne: also one lineally distant from an other and forwarde tendyng, lightly preuentyng euery iniurie offred by dust, or ech flyeng litle creature. As also that for the more firme mouyng of the eye lyddes, the Muscles might be to them inserted, these Cartilages are there iustly reposed.

Next to these are those two constitutyng either eare, so annexed to the hole of hearpyng, to dilate, and keepe open the same continually, to the perpetuall promptitude of hearpyng ech sound and voyce. These Cartilages are made more thicke aboue, and cheifly neare the hole whence they haue their beginning, & are more hard then, because of their vicinitie which the tempo:all bone. Further, about the audito:y passage is this bone made rough, for the generation of Cartilaginous matter, which is to that place affixed, so that by no waight it may slippe down, or otherwise be drawen byward. Both within, & without they are endewed with hollow, and also Gibbous places, the prominent partes outward being respondent to the hollow cauities inward. Agayne, they are aboue round, & beneath prolonged with a litle lappe, or (as we may terme it) a fleshy Appendance: which although it deped vpo the borders of these Cartilages yet is it altogether voyde of Cartilaginous matter, neither standeth it in neede thereof, since it onely dependeth, that is, is sustained, but susteineth not: for the partes that most susteine are most strong. To who should it seme doubtfull to iudge why the eares were

The Cartilages
of the eye lyddes.
In what crea-
tures the Carti-
lages of ypper
eye lyddes are
greater, in what
also they are les-
ser.

Their situation,
why they are pla-
ced in the extre-
mities of the eye
lyddes.

The vtilitie of
the Cartilages in
the eye lyddes.

Gal. Lib. 10 de Via
part.

The vse of the
heares in the eye
lyddes.

The cartilages of
the eares.

Their vles.

Why they are
thicker aboue.

Where they are
harder and why.

Where the bone
of the temple is
rough and why.

The figure of the
Cartilages of the
eares.

Their fleshy ap-
pendance.

Why y substaunce
of the eares was
not made bone.

were not formed for stiffness, rather of the substance of Bones then Cristles, si-
then that substance being made subtile and thin should easily haue broken: or
thicke, massie or Solid to haue combzied the head with the ponderous waight
therof. Therfore of best right their substance was light, and Cartilaginous, to be
lesse endamaged by outward force. And more for comelynes, then for defence
sake they are closely entwapped with a skinne, which is (excepting the borders)
hard, and tough.

Also the extreme portiō of the nose is made Cartilaginous by the great pro-
uidence of nature, both to be shut, whereby to restraine & forbid the ascense of
euill saours, as also agayne to open & be dilated, for & attractiō of breath & ayre.
Furthermore this reason of & substance of the nostrils was expedient (euen as we
sayd lately of the eares) that hardly it might be hurt of outward thyngs, which is
most ofte practised. For being pressed, it yeldeth but neuer breaketh, which so ne-
cessary vtilities had perished had the nostrils bene otherwise made, or of the sub-
stance of bones fabricated. Wherfore most sapiently hath the diuine artificer
decreed this part, as also all other, that is, as the lower partes of the nose were
made Cartilaginous, so also to be knit vnto the superiour Osse partes, whercon
they depend as their seate and foundation. With thre Cartilages is made the
extremē partes of the nose, wherof two constitute the sides called the wynges,
betwene which intercedeth the thyrde Cartilage: whereby are formed two holes
in the nose: and this middle Cartilage is to the bony hedge, or diuision of the nose
answerable, and very finite. But it is onely the wynges of the nose which
haue any motion, being endued with proper Muscles, as well to plucke them
outward, as inward sayth *Vesalius*: but that in no wise consenteth to *Columbus*
sayng: Outward they haue proper Muscles to leade them, but inward no pecu-
lier Muscle: affirmyng that they are shut by the benefite of the lippe. Whose
iudgement truly, if with the thyng it selfe you do conferre you shall finde it apt-
ly consonant with veritie, if my body be like to other mens, or others like myne.
But now forwarde with the Cartilages.

We recited in the former Historie in speakyng of the neither iaw two Carti-
lages, which are found betwene the superiour Processes of the same iaw,
and the bones of the temples. They are moueable, and so: no other cause ordeined
then for the perpetuities of his action, for although the Articulation therof is with
sufficient scope, & slackenes: yet with oft speakyng, eatyng, and gapyng the bones
must nedes weare, or at least leane of to moue by wearynes, were these not mo-
ueable Cartilages their sited, by whose benefite, when soeuer neede requireth,
the iaw readely moueth, neuer (almost) requirynge tyme of rest.

Now agayne, not a litle wondryng that so many of old, and sondry of late
yeares haue deceaued them selues, and erred in their writynges, *Realdus*
Columbus noteth that *Larinx* is conuulged and made of the substance of Bones
wholy, vnles it be the Epiglott, which ought of right to be Cristely, that it might
without hurt admitte continuall mouyng, whiche is caused by continuall expi-
ryng, and inspiyng: besides that it was needefull for it also to moue, whylest we
swallow any thyng or speake, there sometymes to be lifted vp, and otherwhiles
depressed downe, as also in vomityng contrarily pulled, which motions it easily
followeth, the Cartilage yeldyng on either side.

But vnder *Larinx* all *Aspera arteria* is Cartilaginous, distinguished with be-
ry many Cristly rynges: whiche ringes (notwithstandyng) are not wholy
Cartilaginous: so: backwardes toward the Vertebres where it glideth down by
the stomache or *Esophagus*, they are intersected with a Membran, there neuer-
theles bindyng them together. Broken they cannot be, yet was it expedient
they were so fashioned, as to giue place to *Esophagus*, least otherwise it should

Why the eares are
Cartilaginous.
Why the eares
are covered with
a hard skinne.

Why the extreme
partes of the nose
is Cartilaginous.

Why the whole
nose was not
made bony.

Why the upper
part of the nose
is bony.
The extreme car-
tilages of the nose.

Why the wynges
onely of the muscles
moue.

Lib. 1. cap. 17.
Vesalius in error.
Lib. 1. cap. 3.

How the wynges
of the nostrils
are shut.

The Cartilages
in the seat of in-
sertion of the neck
ther iawe.

Their situation.

Their vse.

Larinx hath bene
described as a
thing consisting
of Cartilages.
Lib. 2. cap. 5.
How *Larinx* is all
of bones, the Epi-
glott excepted
Why the Epiglott
ought to bee
Cristely.

The substance of
the ringes of *Trachea Arteria*.

The necessary
source of these
Cristly ringes.

The second Booke of the

The figure of the rings the membran being taken away.

In Angina sometime the membran that couereth these rings may be taken of, or is cut away.

The progresse of Trachea Arteria. Of the cartilages. Of the vertebres. The first vertebre wanteth a cartilage.

The vse of the cartilages of the vertebres.

The quantitie of the Vertebres changeth the quantitie of the Cartilages.

The Cartilage vnder Os sacrum. The Cartilage betweene the bones of Coccyx.

Why in women ther is much of a cartilage betweene the first and second bone of Coccyx.

The situation of the Cartilage in the toppe of Sternon. The diuers vse of the Cartilage in the toppe of Sternon.

The vse of the Cartilage in the middle of the brest.

Both the true and false ribbes haue Cartilages.

The shorter ribbes haue shorter Cartilages and contrariwise.

The figure of the Cartilages of the ribbes.

The vtilities of the Cartilages of the brest.

The brest is naturally mouyn.

The mouyn of the brest is voluntary.

The vse of the false ribbes.

suffer compression by them in swallowyng the sustenance, the which Membran if you take away wholly, the ryngs appeare vntoynd representing the figure of this letter C. But now they are together by the inuolapping of this Membran, which, in that sharpe disease called *Angina*, may perhaps sometyme be taken or cut away. The iourney of this rough Arterie endeth vnder the canell Bone, where it is cut into two partes or bowes, whiche are after separated into other two, and those agayne into others, and so at the length dispersed throughout all the substance of the lunges, to transport the ayre inspired and expired.

Next, we speake of the thicke Cartilages, whereby the bodies of the Vertebres are committed together: the first excepted, which as it hath no body, neither any Cartilage. But to speake of the benefite which here these Cartilages giue: we finde that by them the Articulation and knitting-together of the Vertebres is made more slacke, and easie, whereby they can bowe forward, backward, and to the sides, aptly, after the will of the creature. Their breadth is answerable to the bodies of the Vertebres, leueying, or making euen their ends where they meete. Therefore, as the turnyng ioyntes of the backe do still, in goyng downward, increase in quantitie: so accordingly these Cartilages are made greater and thicker, to the end they might not want wherewith to endure the greater increase, and waight of bones.

Vnder *Os sacrum* also, where the tale bone is fastened, a Cartilage lyeth: and much of a Cartilage is put betwene the first and second bone therof, but especially in women, because in bringyng forth the byrth, the tayle bone (as we haue declared heretofore) yeldeth backward, but in men it is neuer moued from his seate.

So likewise the top of Sternon hath on each side a Cartilage, where it admitteth the knittynge to of the Cannell Bones, and these also mouable accordyng to the vses of the Cartilage of the neither iaw before expressed, although these haue nothyng so apt, and often mouynges as that hath. Notwithstanding in great crynges, and swallowyng of the meate, as also to expiration and inspiration, those are much conducent, whilest the brest is some whyles drawen together, and other tymes riseth: so is the expedite mouyng of the armes procured thereby.

Agayne, betwene the first, or second bone of the brest is sited a certayn Cartilage, which is soft, and usurpeth the office of a Ligament: whereby the superiour part becommeth more apt to moue.

The ribbes also grow Cartilages like vnto Appendaunces, in so much as respecteth their anterior partes, aswell in the true ribbes, where they are committed to the brest bone, as in the false ribbes not adherent to the brest bone otherwise then by the Cartilages of the true ribbes. Wherefore in the ribbes this more is notable, that the shorter ribbes haue shorter Griffles, and the longer ribbes, the longer Cartilages: so to the hypermost ribbes are round Cartilages, but to the neithermost much broader. Their vses we haue almost sufficiently touched in the description of the ribbes. For accordyng to the mouyng of the lunges they make the ribbes to yeld: sithens it behoneth the brest to be often lifted vp, & often depressed. Which mouyng although it be naturall, yet should it not be so free, if all the ribbes were of the substance of bones: neither might nature long endure the voluntary mouynges of the brest, which are requisite in putting forth the voyce, but that the Cartilages minister an ease to the laborious dilatation of the brest. Besides this, the false ribbes yeld an excellent effect vnto the body, and not to be neglected, in giuyng scope vnto the Ventricle when it swelleth by repletion. Which gift is not small, since all do know what great incommodities to the body, compression at that instant might inferre.

The

The brest bone, called also Sternon, in the neither part therof hath a Cartilage of a trianguuler forme, although sometimes foure square, and in others clouen in two. Some therfore haue called it a litle sword, others the shieldlike Cartilage, others *Mucronatum*, that is to say, sharpe pointed or edged, the Arabians, *Malum Granatum*, the Grecians *Σποειδης*. But what soeuer name it meriteth, yet nature made it not to that end, as it is commonly iudged: that is to say, for a defence, & propugnacle to the mouth of the Ventricle, which farre distant fro this, lyeth in the left side. But more rightly they might iudge, that it gardeth the hart, & defendeth *Septum transversum*, whose tendon is knit thereto. Wherefore it hapneth, that a wounde in this place is dangerous, and deadly: for bicause nature placed there this Cartilage, as a shield vnto it. Whiche groweth so fast vnto the lower part of the brest bone, that without great force it may not be plucked away. Wherefore they are worthy derisio that suppose it to slippe fro the seate soinetyme.

In the head of the shoulder blade, or scaple bone is an hollow or cōcaued place whereto is annexed a Cartilage for the augmentation therof: for in that part (els) the compasse of the shoulder blade could not haue suffred so deepe a hollow as might haue bene sufficient to the receiuyng of the head of the shoulder. Nature therfore for the augmentation therof deuised a Cartilage wherewith to contriue a deeper profunditie, which also so artificially is wrought, as that the same ioynt by the mobilitie of this Cartilage is made more agile, easie, and active: and by the altitude and depth of the same cauitie, at no tyme is easely displaced. Which, when it hapneth, is not without great diligence repayred.

The like Cartilage we finde in the cauitie of the hippe, which admitteth the long, and rounde head of the thighe bone. But that is not made there any thyng moueable, but onely to that end prepared, that the borders of the same cōcauitie might more highly be augmented, and so the profunditie be made greater: bicause the huckle bone els might not be so deeply excaued, as should seeme sufficient to admit the longitude of the head of the thighe.

Furthermore from the lower heades of the thigh, to the vpper regio of the legge, are two Cartilages like halfe circles, the one on the inside, the other on the out side. I can easely compare their figure to the fashion of a sickle, thicker on the out side and thinner on the inside, and inwardly endyng at that tubercle, which in the middle vpper face or end of the legge riseth, where they are ioynd together. And they are made to encrease the cauities there in the toppe of the legge extulped: wherein more fitly are inserted the lower heades of the thighe, neither that the moving of the ioynt should be hindered.

To come vnto the wrist of the hand, neare to the poynted Processe extended from the extreme head of the cubite, whiche Galen in wayne beleued to be knit to the fourth bone of the wrist, is a Cartilage put, which fulfilleth the same place beyng otherwise boyde and empty: preuentynge likewise, lest that part of the hand, whilest it is bowled to that side, should strike vpon that sharpe Processe to the great greuaunce, and hurt therof.

Moreouer, betwene the bones of *Pubis* cleaueth strongly a notable Cartilage, whiche in the superiour part is broad, and thicke, but goyng downewardes, decayeth by litle and litle, endyng at a sharpe, in that place committynge together those bones, like most hard and cleauynge glew, so fast in deede holdyng them together, as that more rightly growynge, then ioynyng together they may be termed. And for that cause in the former treatise, we haue reproued the opinions of such, as are not ashamed to affirme these bones to open in the tyme of child bearyng, whilest with a knife, without great labour (as oft hath bene assayed) they bitterly refuse to be separated.

The figure of the Cartilage in the lower part of the brest.

The names of this Cartilage.

The vse of Mucronata Cartilago after the popular iudgment.

Why a wound receiued in mucronata Cartilago is deadly.

Mucronata cartilago slipper not from the brest as some suppose.

The Cartilage in the head of the shoulder blade and vse therof.

The shoulder is seldomne hurt. The Location of the shoulder hath difficulte retention.

The Cartilage in the Concauitie of the hippe is not mouable.

The vse of the cartilage in the concauitie of the hippe

Two Cartilages in the inferiour heades of the thigh

Their vse.

The Cartilage in the wrist of the hand.

The vse therof.

The substance and figure of the cartilage between Osia Pubis.

The vse therof. Osia Pubis seeme rather to grow together then to ioyne together. That the bones of pubis doe open in childe birth is false.

The second Booke of the

Why the bones
in their ioyntes
are inclosed with
Cartilages.

Why in the Car-
tilages of the
ioyntes lieth a
certaine thimmes.
There is supposed
the fittest place to
write the nayles.
The substance of
the nayles.

The difference
betwixt the nayles
and Cartilages.
The vse of the
nayles.
The nayles can
bow but not
bryake.

Lib. de Vfu part. 1.
The nayles are
hard in a notable
meane.
The marvellous
art of nature.

Why the nayles
are of round figure.
The nayles doe
grow alwaye
whilst the body
ceaseth.

In what order
the nayles doe
growe.

Cap. 3 8.

The new part of
the naille that sprin-
geth thrusteth for-
ward the olde.

Cap. 15.
The originall of
the nayles.

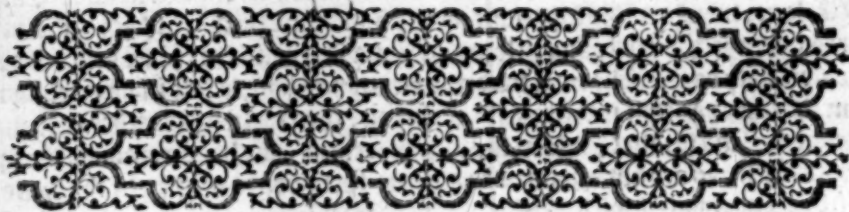
Why vnder the
nayles is such ex-
quisite sense.

Also there are Cartilages bestowed on euery ioint, whether the metio ther-
of be obscure, or manifest. For in the ioyntes it behoued the bones to be en-
crusted with such Cartilages as be light, and slippery, for the easie prouoking
of motion: and that by mutuall construction they be not woyned. Wherfore re-
sistde alway added vnto them a certaine moyst matter, wherewith, as with a cer-
taine fatnes the ioyntes are continually noynted.

And this I hold fully sufficient for the declaratiō of Cartilages through out
the body. Notwithstanding it is best determined in this place to speake
somewhat of the nayles, before I make an end. Whiche, although it be truly
sayd that their substance is meane betwixt bones and Cartilages, being neither
so hard as bones, nor so soft as Cartilages, from which in colour also they differ
much: yet we haue ioynded them vnto the treatise of Cartilages, as more appo-
prieate to the nature of them. They of right defend the most soft partes, the endes
of the fingers, lest they be lightly hurt by euery outward occasiō. Wherfore their
hardnes establissheth firmly the endes of the fingers, and to the apprehending of
harder thynges, are approued most necessary, so made to bow and giue place, but
not to bryake. Likewise nature (sayth Galen) was circumspect, that in making
them hard they should neither lose the vtilitie for which they were made, nor they
them selues suffer any thyng easely: accordyng to her custome, in making in ech
creature euery prominent particle of such substance, as that neither for softnes
they may be crushed, nor yet for dyines broken. Likewise for securitie sake the
nayles are of rounde figure. For of all other figures the rounde offreth lest ad-
uauntage whereby to be hurt, bicause it hath no corner standyng forth of power
to be broken. But bicause by stretchyng, and euery other action of the nayles,
their extremities must needes be woyned, to their growyng was annexed perpe-
tuitie, although the whole body els be diuened to the defect of growthe. But howe
sayth *Fuchsius*, they grow not as other mēbers together both in breadth, length,
and thickenes, but onely in length: the new (sayeth Galen) euer driuyng for-
wardes, and thrustyng out the old. So that euer in place of that, whiche in the
extremities of the nayles is dayly woyned, new commeth forward, and suppli-
eth the rowme.

Realduus Columbus proueth the originall begynnyng of the nayles to come
from the skinne, and the tendons extending the Muscles of the fingers,
although vnder the nayles the tendons are caried to the extreni-
ties of the fingers: for heare they are afterwarde dilated,
as shall seeme likely to ech sounde iudgement, sithens
vnder the nayles lurketh such exquisite sense.

¶ *An end of the History of Cartilages.*





Ad not the ioyntes of the bones, and Cartilages by Ligamentes bene compact & bound together, nothing might haue prohibited the bones, and Cartilages by euery motion to be loosed, and fro their naturall seate one from an other remoued. Which that it might not come to passe, the creator of all thyngs commaunded that all the ioyntes of the bones, and Cartilages, should be clothed about with Ligamentes: by whose benefite, the bones might safely be bound together, & in their ioyntes contained: neither readyly by euery violent motion to be broke one from an other. For, that their substance by the strong force thereof

denyeth. And agayne by their hardnes, go free from receiuyng hurt by the continuall, and incessant motions that be vsed.

But to begyn at the interpretation of the name: A Ligament is called of the Grekes *συνδισμος*, the Latins *Vinculum*, which we translate a Bond. It is in substance, hard, white, and of sense, and hollownes boyde, yet not so hard as the Cartilage is. The begynnyng therof is at the bone, and the end thereof is at the bone, except a certayne, which more particularly shall be touched in their places.

A Ligament is made to bynde together our mebers, and therfore chooseth the name of a bonde, and without them our partes were lost, and might not moue. For although their substance seemeth sinewy, yet (as I sayd before) it is altogether boyde of sense euen as the bone, and Cartilage: in which poynte, with wonderfull prayles the prouidence of nature is to be extolled. For if the Ligamentes had bene endewed with sense, what paynes should we labour in at euery motion of the bones?

Beside, the Ligamentes are made for the production of Muscles, as somewhat before we haue noted where we entreated of the vse of Appendances.

Agayne if you marke, you shall finde euery Ligament so hard, as that it hath the might strongly to bynde: so as neither the ioynte may be broken, neither the moving of it (in so much as appertaineth to the profitable vse thereof) thereby hindered. And this is the first & chief vse of the Ligament (sayth *Vesalius*.) All, which belongeth to their second vse, is that they in their proper places containe the tendons, lest they from their states decline, or be eleuated in their action.

They are nourished notwithstanding by a thynne medullous matter. Wherefore, betwene the bone and the Appendance nature placed the Ligament, to the end they might more aptly draw their nourishment to them.

And although the situation of all the Ligamentes is almost after one kynde of order, yet much in them selues do they differ. For of them, some are thicke, some slender, others great, some small, some broad, some narrow, some round, and some not round: and other differences diuers of them chose, as more expressely shall be declared in their particuller explications. Which that it may be done in order we will begin at the Ligamentes of the head, which is the principall part, all Philo-
sophicall opintions notwithstanding.

From the bones of the head & vpper iaw, betwene the seames & commissures, springeth Ligamentes thynne and broad: which, beside that they bynd together these bones with a most strong tyeng, are made for the original of those Muscles, which from those partes haue their begynnynges. As be the Muscles of the

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face,

Vesali lib. 2. Cap. 2.

Why nature created Ligamentes to the body.

Colum. Lib. 3. Cap. 1.

1. The name of a Ligament.
The substance of a Ligament.
The situation of the Ligament euery where.
The vse of the Ligament.

Why the Ligament wanteth sense.

2.
3.
The second vse of the Ligamentes after *Vesalius*.

The nourishment of Ligamentes.

The difference of Ligamentes.

The head is the pynce of all other partes whateuer philosophers inuent.

The Ligamentes of the head. Situation. Vse.

The thyrd Booke of the

The articulation
of the head with
the Vertebres is
most noble.

Why the Liga-
mentes of the
head with the
Vertebres are
most strong.
Luxation of the
head is deadly.
The heades of
those that be han-
ged are not Luxa-
ted accordyng to
the common opi-
nion.
The first Verte-
bre sooner bea-
reth then is Lay-
ered.
The originall of
this Ligament.
Why the hinder
part of the head
or Occiput is in
children in many
places.
The new place of
this Ligament.
The Ligament
haueth to the towth
of the second Ver-
tebre.
The third Liga-
ment.
The vse of the
Ligament.

Why be enten-
teth not of every
Ligament.

He determineth
of such as in some
thing differ from
others.
Galen in error.

Lib. 1. Cap. 2.

The true vse of
the Membran in
the hole of the
Vertebres.

face, neither eare, and eyes, all whiche arise from the scames or Commisures. And because the Articulation of the head with the Vertebres is more excellent, & of greater value then the rest, diuine nature & mother of humane seed, hath shewed therein more care, & greater diligence then in all others. For, wher so great waight as is the head must needs be knit vnto so small bones, as be the Vertebres, or rather if it be lawful thus to say: when nature compacted the frame worke of bones, and in comparing the head with his lease, founde, in respect of the waight of the head, the Spondills of the necke to be very small, determined to mende the misse by Processes fit for spenges, & annexing to the cavities of the bones stronger Ligamentes, then in all other partes of the body. And sithes this Articulation might suffer in no wise to be Luxated (because euery Luxation of the head is deadly) it was provided that these Ligamentes should so strictly, and faithfully cōtaine, and hold together those partes, as that Luxation there should be most difficult. Although it be supposed among the common sort, that the heades of such as be hanged hauing a great impressed circle left in the necke, are Luxated. Others say their neckes are broken. Which to be true eche one that laboriously shall dissect, or willingly see Anatomy, shall deny. For of such inuincible force is this Ligament, as that the first and second Vertebre (to which the head by it is bound) shall more easely at any tyme breake, then be Luxated.

From the foundation of the hinder part of the head riseth this Ligament, which that it might be the better nourished and more firmly stand, Nature maketh the hinder part of the head in children with many partes and diuisions, to be hereto the better stay. This bonde is round compassing, and downewardes descendyng betwene the first and the second Vertebre, not fastned, as some haue supposed, but euery where, and round about them most strongly cleauyng, so that to separate the same in dead bodies them selues, is a thyng most difficult. For it cleaueth to those bones both before, behynd, and on ech side.

Besides this Ligament hether to described, there is an other also sufficient strong and hable, which firmly is knit vnto the towth of the second Vertebre.

Agayne, besides that, there is a thyrd, which springyng from the inner part of the first Vertebre, containeth fast the towth of the second (the which towth is mentioned before in the treatise of bones) beyng round: but the sides thereof by marvellous arte so made, as that the towth, when the head is much enclined, can by no meanes hurt the Spynall mare, which that way passeth. And in this sort are the Ligamentes seruyng to the actions of the head.

But because we should offend in to much prolixitie, if all the Ligamentes of euery tynite we should particularly describe, we therefore comprehend all them of the head together, and those especially which differ no other wise among them selues then in greatnes or litlenes. And for that cause, we will walke in silence so: ward with the neither eare, whose Ligamentes els should be spoken of after those of the head. Of others therfore we will speake, that by some meanes do vary from the rest.

And for because Galen writeth in his booke of Bones, that the Vertebres are not contyned in the middelt with any proper Ligament, but by the thyrd tunicle onely, which enuoyappeth the Spynall mare, and (sayth he) is caried in the middelt betwene the Vertebres, to connect and knit them together: *Columbus* accompteth it vntwo: thy to be the sentence of so worthy a writer: For by what meanes (sayth he) could it seme vnto hym that the Vertebres, beyng no litle bones could be holden together, of so slender a Membran as that, which is in the hole of the Vertebre where the Spynall mare runneth. But the true vse of that Membran is to prevent the Spynall mare, which, by to nye beyng to the bones, might be hurt easely, by the which great incommoditie might ensue. It is ther-

foze notable, that all the Vertebres (onely the two first excepted) are endelwed both aboue, and beneth with Appendaunces, as we somewhat remembred heretofore: out of which riseth strong Ligamentes, bindyng together the Vertebres among them selues, and deteinyng the Cartilage in the middest betwene the Vertebres. And it behoued them to be sufficiently strong, considering the great waight whiche the Vertebres must beare, and the strong motions whiche they ought to resiste.

After this order these Ligamentes are deduced, that is to say, from the inferiour part of the second Vertebre euen to the extreme end of the tayle, about whose body these are sited.

Furthermoze, from their transuerse Processees others also are produced, for the ioyning to of ribbes and Muscles.

Others issue out agayne from the hinder part of the Spondilles, both to confirme the Vertebres, and also to giue beginnyng, to some Muscles.

Now to leaue these sufficiently spoken of, it shall not seeme vnorderly to prosecute and goe forward with the Ligamentes of the tongue, and *Hyoides*. For betwene the bones constituting *Hyoides*, passe Ligamentes for the construction of the toung. Two are brought from the two greater Processees, with which it is knit to the toppe of the toung. Other two goe forth from the stilfozmed Processees of *Hyoides*, holdyng it so vp as if it were hanged in two chaynes: lyke as Historiographers write the yron Tounce of Mahomet, to be suspended in the ayre by the attractiue force of the Adamante. Lastly there is vnder the tongue a Ligament, which in many children that we call tongue tyed, cleaueth to sondry places towards the foze teeth, not sufferyng the tongue to be vp, nor the lippes to goe out, and not beyng cut shall corrupt the speache, the child hauyng power to make distinction of wordes.

Next, for bicause the Brachiall Ligament, or that of the wryest is diuers from those of other ioyntes, we will speake thereof particularly. The Ligament therefore seruyng to the wryest of the arme, begynneth at the inferiour Appendaunce of *Radius*, & *Cubitus*, whose office seemeth to be lyke as of other ioyntes, to bynde together the two distinct orders of Brachiall bones, lest in euery motion they slippe out from their seates.

Prudent Nature therefore prepared a Ligament sufficiently strong, whiche so byndeth together these *Osicles*, as that they are alway ready to the executyng, and fourmyng eche proper motion: but at length is emplantod to the Appendaunce of the *Postbrachiall* bone, and serueth to the articulation of the wryest.

In this same region are also other Ligamentes, not seruyng to the Articulation of Bones, but onely to contayne those tendons whiche serue both to the fingers, and extreme part of the hand, least whilest the fingers moue they should sodainly slide to this place or that place.

In the inside of the wryest, is a forcible Ligament, and that ouerthwartly lying, which containeth the tendons of the fourth, fift, and sixt Muscles bowyng the fingers. Neuerthelesse on the outsyde there be fixe Ligamentes euident, conteyning in like sort the Muscles extending the fingers.

Among other thynges it is notable to be marked, how all these Ligamentes at the first sight seeme to be but one. Albeit if we diligently follow the tendons, fixe transuerse Ligamentes begynnyng at the two aforesayd Appendaunces, come playnly to our sight.

But now we are comen to this place, it shall not be amisse to entreate of those Ligamentes which containe the tendons after the longitude of the fingers. It is therfore to be noted, that in the inner sides of the bones of the fingers, and after their longitude are lodged Ligamentes reachyng euen vnto the extremi-

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ties

All the vertebres haue the 11 first hane appendaunces.

Out of the appendaunces spring the Ligamentes of the vertebres. Why the Ligamentes of the Vertebres are strong.

The deduction of these Ligamentes.

The vse of these Ligamentes fro the transuerse Processees.

Two Ligamentes to p toppe of the tongue.

Two ligamentes from the Processees called stiloides that suspend the bone Hyoides. The arke of Agahomet.

The ligament vnder p tongue.

How children become tonguetied.

Of the Ligament of the wryest. The rising of this Ligament.

The vse thereof.

The insertion of the Ligament of the wryest.

The Ligamentes of the tendons of the fingers and extreme part of the hand.

The vse of the Ligament on the inside of the wryest. These vi. Ligamentes seeme as though they were but one.

Of the Ligamentes containing the tendons after the longitude of the fingers.

The thyrd Booke of the

ties of the tendons: which nature there hath prudently placed, lest in their bowynges the tendons might be lifted from their places.

In the knittynge together of the thighe with the bone of *Coxendix, Ilium*, and *Pubis*, beside that Membraneous bond, but thicke, whiche is common to all ioyntes, there is a round Ligament, whiche rising from the depth of that great concauitie, or acetabulum, so largely grauen out of the aforesayd Bones, is inserted to the head of the thighe: beyng of such strength, as that oft tymes it is broken whilst that part is Luxated, and so, that although the bone be restored to his wonted place, yet beyng displaced the party is alway lamed: because this Ligament still hindreth the knittynge together of the bones.

Also betwene the inferiour heades of the thighe, and the toppe of the legge in the inner part of the kne, is a thicke Ligament rising from their Appendances, and ending in the legge, made for the holdynge together of those partes. For, there being in the body no greater ioynt then these two last recited, no marueil that nature addeth to them such Ligamentes, as to no other, saue onely betwene the head and the two first vertebres.

Besides the thyrd Ligament, there is yet another, which almost compasseth about the Articulation of the kne, and here and there wappeth about the Rotule, of the which it is onely deteined. If any thinke such a round Ligament (as hath bene before mentioned) is fastned so betwene the head of the shoulder and the scaple bone, he is much deceaued.

But to speake more of Ligamentes, let vs yet goe further, whilst we finde apte cause, and commodious occasion. Therefore betwene *Os sacrum* and *Coxendix* is a Ligament, not so much rounde, but riseth from the extreme part of *Os sacrum*, and endeth ouerthwartly at the sharpe part of *Coxendix*. It gathereth together these bones, and therefore is made to deteine them, beyng knit together: although it may be put to other vse, as preparing passage to the great Arterie which in man is founde.

In the setting to of the foote, betwene the same, and the two bones of the legge *Tibia*, and *Fibula*, beside the bonde whiche is common to all ioyntes, there are six other to be discerned, such as in the outside of the wyest were lately spoken of. Their vses are these, to contayne those tendons which serue to the extreme foote and toes: which tendons, if these were not here placed, would for euery small occasion be peruerced from their seates and places.

There lye also vnder the toes of the seete Ligamentes, euen as in the fingers of the hand, made to contayne those tendons in their offices whiche bowe the toes, that is to say, the second and thyrd ioynte.

All ioyntes there is one common Ligament, and that hath his begynnyng from one bone, that is to say from one Appendaunce, and endeth in another. These amplex and inwappe them rounde: so haue they others more slacke, and others agayne more straight, accordyng to the greatnes and litenes of the Bones. Therefore esteeme that I speake in this place generally of all the Ligamentes, what soeuer they be, that bynde the brest, scapples, Cannell bones, nether iawe, shoulder, cubite, fingers, the small bone of the legge called *Fibula*, that part of the foote called *Tarsus*, whiche (as appeareth before in the History of bones) may be compared to *Brachiale*, and therefore esteemed for nomination sake as the wyest of the foote, and the bones of *Pedium* answerable to the *Post-brachials*. But if you enquire of the Ligamentes of *Ilium*, and *Pubis*, I will answer, that they differ from others in nothyng but mouyng.

Betwene *Cubitus* and *Radius*, and so betwene *Tibia* and *Fibula* after their longitude, is a Membraneous Ligament, sited betwene those spaces. Whose vtilitie is not onely to vnite, and bynde those Bones together, but also lyke an hedge,

To all ioyntes a thicke membraneous bond is common.

The round Ligament seruynge to the Articulation of the hyppie.

The rising of it.

The insertion.

This Ligament in the Luxation of the hyppie may be broken.

Why though luxation of the hyppie the patient is after lame.

The ioyntes in the thigh are greater and haue therefore greater Ligamentes then all others in the body sauynge the head.

The Ligament compassing the Rotule of the kne.

Betwene the scaple bone and shoulde is no round Ligament.

The Ligament betwene *Os Sacrum* and *Coxendix*.

The risinge.

Insertion.

Vse.

vi. Ligamentes in the foote answerable in proportion to the vi. in the wyest of the hand.

Their vse.

The vse of the Ligamentes vnder the toes.

What is common to all ioyntes.

The numeration of certayn partes endued with Ligamentes.

The Ligamentes of *Ilium* and *Pubis* how they differ from others.

Of the Ligament betwene *Cubitus* & *Radius* and *Tibia* and *Fibula*.

The vse of this Membraneous Ligament.

hedge, deviding the interiour from the exterior Muscles. After which sorte are the Ligamentes set in the holes of *Pubis*, to distinguish the ninth from the tenth Muscle.

The bristle of the Ligament in the holes of *Pubis*.

The *Liver* is conteyned with two principall Ligamentes, whereof the one is toward the right part, the other toward the left, the left being thicker then the right. These knit the liver to *Septum transversum*, lest downward it should be forced to fall by the waight therof. The right of these two Ligamentes is called a *Suspensorie*, but the left hath no proper name.

Of 2 Ligaments of the liver. Situation. &c.

The Ligament named a suspensorie.

Now that I have waded thus farre in the description of the Ligamentes, touching such particularly as differ in proportion notably, and comprehendynge the comon sort in byiefer order, I will here end, omitting to speake of *Mediastinum*, *Pleura*, *Pericardicon* and *Peritonaeum*, (although they might seeme worthy to be spoken of among the Ligamentes) because els where finding fit, ter occasion to touch them in appoaching so neare, whilest other partes are shewed, I haue largely ynough reuealed their properties. Whiche notwithstanding are no Ligamentes worthely to be called, but Membrans, hauyng perfect sense, whiche Ligamentes neuer possessed. Although amongst all other, the Ligamentes of the *Liver* are not altogether of sense frustrate.

Mediastinum, Pleura Pericardium, and Peritoneum are Membrans, not Ligamentes.

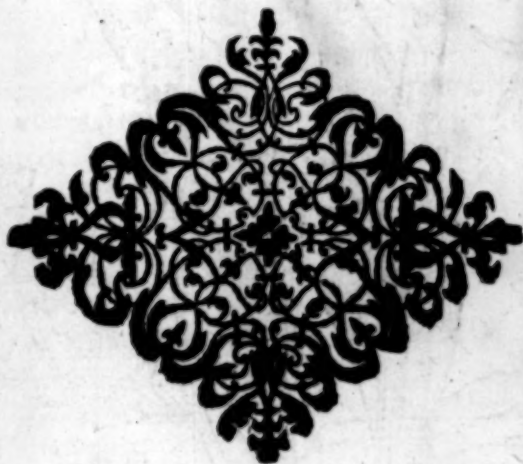
The Ligamentes of liver are not wholly destitute of sense.

Hereafter be attentue how the members are moued by Muscles.

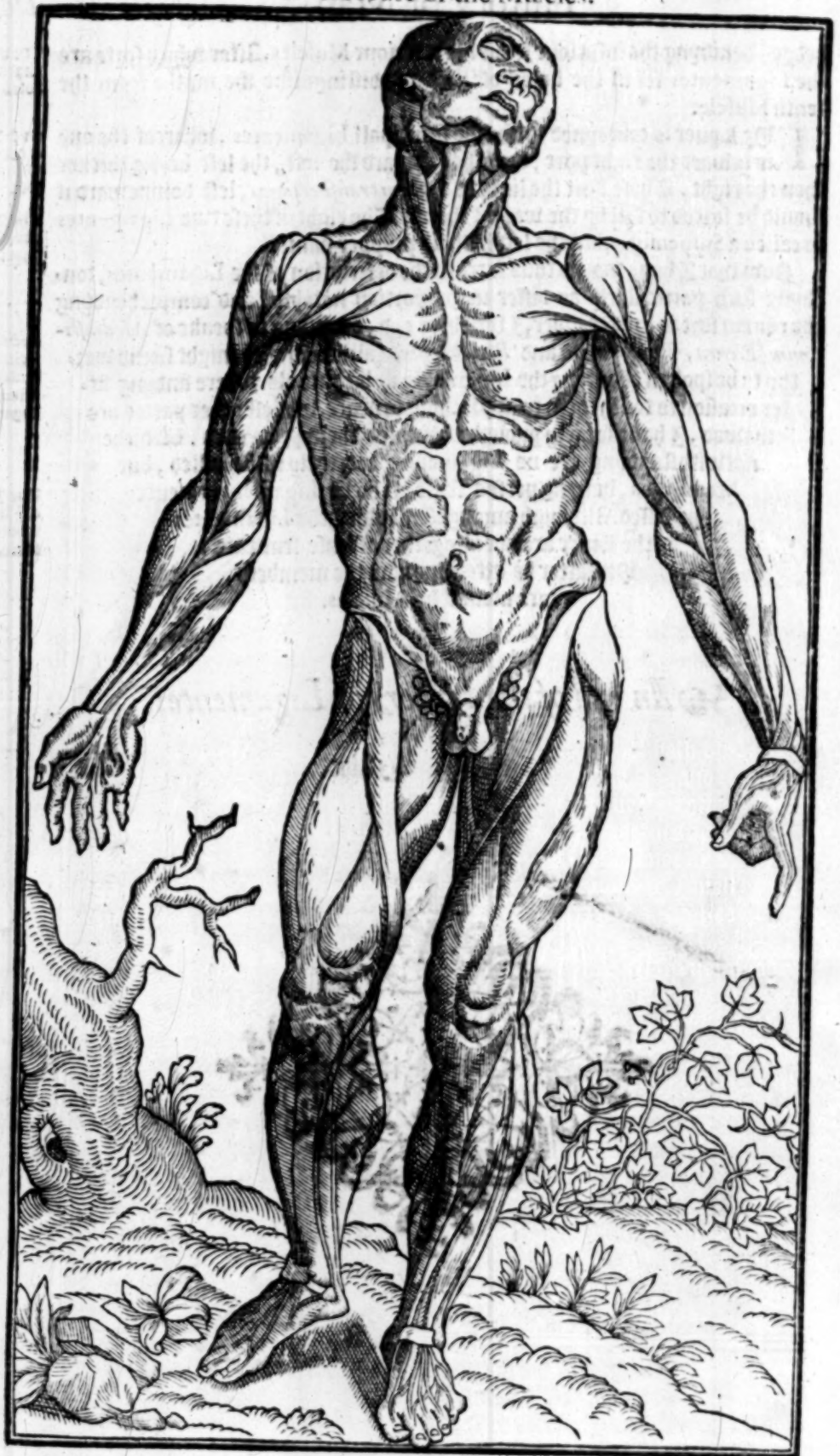
✂ An end of the History of Ligamentes.

¶

The



The forepart of the Muscles.





Muscle which the Grecians call *μῦς*, the Latins *Musculus*, is an instrumentall part of the body, and in deed the instrument of volūtary mouing, without which, no part of our body could move at our will and desire. When Nature therfore had construed the frame worke of the body, with the Cartilages, and swathed them euery one in Ligamentall bondes, accordyng as to euery part she called vnto, it followed then necessarily, that some instrument were deuised whereby those partes should be drawne mutually one to an other accordyng vnto the will of the creature. In consideration of whiche necessities, nature easely did foresee, that onely by Ligamentes she

myght not vse voluntary motion, because they were neither with sense nor mouing endued, not being continually with the vertue of the animall power: neither yet of Nerves onely actio might be made, since they haue not the force, thorough their softnes, and tenuitie, to draw, and vse so great a waight as behoued. Wherfore she deuised at length, of both to make an instrument of mouing, which might be in conclusion harder then the Nerve, and softer then the Ligament: therewith also to participate of sense lesse then the Nerve, but more then the Ligament. So that of the Ligament the Muscle hath his strength, and of the Nerve whereby to feele and moue. *Columbus* to this purpose hath these wordes.

A Muscle (sayth he) is construct & made of Fibrous flesh, Ligaments, Nerves, Veynes, Arteries, & Membranes. With flesh that the body therof might be large, or to confirme & hold together those partes as sayth *Fernelius*: wth Nerves, that it might carry with it the moitue vertue that springeth frō the brayne: with the Ligament, that in mouing it might be the stronger: with the Veynes, to be nourished: with the Arterie to possesse vital caliditie: and the Membran entwappeth, and holdeth all these together, seuering also one Muscle from another.

So, some suppose it to be called a Muscle after the likenes that it sheweth of a Spouse, whose head is small, the bellye broad, and tayle long and narrow: others likewise imaginyng of the likenes of the little beast called a *Laserte*, doe nominate the Muscle *Lasertus*. Diuers do agayne thinke it liker a Fish, and therfore call them little Fishes. But truly none of these fourmes are to be founde in all muscles. For some are broad, some thicke square, some foure square, others round compassed, many thicke, diuers slender and small, certayne of them short, and sondry long: here, some containyng one manner of Fibres: there, others mixt with all kyndes: in this place, some are endued with two kyndes of Fibres: and in that place many are interwoolen with thre. Thus beyng diuersly fourmed, & diuersly composed, there is no certayne comparison to be made vnto them, accordyng vnto the likenes of any thing, but if it represent one, it is diuers frō others, and shewyng the shape of some perfectly, & is repysoned of others immediately.

The endes of Muscles are in tendons, or as we commonly say, choydes: yet not all, for you shall see many without the. Contrariwise some Muscles haue tendons in their begynnings, & some in the middelt: although *Galen* maketh mentio of the fourth Muscle onely that openeth the neither iaw, wheras takyng occasio to speake therof, he geueth great prayles, & commendatio vnto Nature: but he might also haue described (sayth *Columbus*) the fourth Muscle, which draweth *Hyoides* downewardes, and receineth his tendon of Nature in the middelt.

A. iiii.

There

What a Muscle is and description thereof.
Vesal. Lib. 1. Cap. 1.

The maruelous workmanship of nature and toynght.

Why voluntary motion could not be by Ligaments why not by Nerves.

What instrument at length was concluded vpon.

The Muscle hath lesse sense then the Nerve and more then the Ligament. Which do constitute the Muscle, and the effectes of those partes in the Muscle.
Fer. Lib. Cap. 5.
Vesal. Lib. 1. Cap. 2.

Whence it is called a Muscle after the opinion of some.

The fourmes of Muscles are diuers.

Muscles ende at tendons, but not all.

What Muscles serue their tendon in the middelt.

The fourth Booke of the

The number of tendons to Muscles.
The figures of tendons.

The rising and insertion of Muscles.

The perforation of tendons.

What is a tendon.

The difference between the Muscles and Nerves.

A Muscle is the organ of voluntary moving.
Nerves & Muscles extremely moving.

Affected much erected in the paces of mans body.

Nerves to be disseminated into the substance of Muscles.
Lib. 2. Cap. 3.

The error of Vesalius in the distribution of Nerves through the muscles.

Columbus against Vesalius.

What part is called the face.

There are yet some Muscles which haue but onely one tendō, others ij. some iij. or iiij. or moe. As the long Muscle of the backe, and the fist of the brest. Some haue long and round tendons, some haue round but shorter tendons, others haue tendons both long and broad: others likewise broad and short: so that many, and sondry are the differences of Muscles, as lately I sayd, and more aptly shall appere in the peculiar History.

Forouer Muscles, although commonly they haue their begynnyng from the Bones, and also end at Bones, yet not all of them obserue that rule: for some spryng from Cartilages, others from Membrans, hauing their begynnyng, and haue likewise dected in Membranes euen so to haue their endynges: diuers after their erecture descend: diuers so contrarily ascend: many are sited ouerthwartly, and many in crooked, or oblique sort are placed. Neither do the Muscles obserue one rite or order in their erecture or begynnyng, but some long, some short, some slender, some thicke: some tendinous, some fleshy: and some shewing the tendons mixt with flesh. Agayne of the tendons of Muscles, some be perforated, some not, others with one hole, many with moe.

But heare perhapes, so oft namyng this word Tendon some will be desirous to know what a tendon is, which I haue nowhere hetherto declared. Note therefore that a tendon is the white part in the Muscle hepyng hard, thicke, and shynnyng: and newly discovered, draweth the beholders into admiration of the sayre and pleasaunt soure the of. And although a tendon be endued with much sense, as vaily experience approueth vnto vs, yet is it not the same matter as is a Nerve, but differreth much; for although the Nerve be, white, yet is it nothyng so hard as the tendon but rounder, and not so shynnyng, and hepyng cut, the body is endued with many strings, and clothed with a Membran: as also hepyng cut, is very hard and solid, but the Nerve contrariwise. Furthermore a Muscle (eue as lately we sayd) is the Organ of voluntary moving brought vnto them by the benefite of Nerves, and this power is geuen vnto the Nerves from the brayne: which is the fountaine of feelyng and moving, as througly in this our History of mans body is alleaged, and approued. Although that renowned Peripatetician Aristotle (who in Anatomicall affectiōs wandred wide) sayth in his booke *De somno & vigilia*, that the hart is author of feelyng and moving in euery creature: which is as certaine as that the hart is the fountaine of blood also.

But to retorne agayne, it is most necessary that euery Muscle in consideration of his office haue a Nerve, although that a small one, and some tyme Nerves. And here note, that when we describe a Nerve carped to a Muscle, we meane not that it is brought neare vnto the Muscle, neither yet to passe straight through the middell of it, but such Nerves vnderstand to be disseminated, and sowed through such Muscles substance. Wherefore in that *Vesalius* would needs affirme, that there were some Muscles destitute both of the Veyne, Arterie, and Nerve, & namely the four square Muscle nigh the wiest, which moueth *Radium* directly downward, to know no better at all, *Columbus* not vnworthely reproveth him (in my judgement) as one, that hauing slender skill in this, resisteth reason: for (sayd he) I am certaine, that in this Muscle is a Nerve as euident, and perspicuous as in any other, and not difficult at all to be found. The like also he willett to examine of that Muscle which maketh the broad tendon and of others that *Vesalius* excepteth. Wherein he seemed rather willing to deride *Pastore*, then to open his owne no obscure negligence.

But to prosecute the particular treatise of Muscles, and to speake of them orderly, let vs begin with the face: which is ment that whole space betwene the heare of the head and the chinne.

It is declared in the proper place how the fleshy Membra subiected vnder the skinne

skinne through out the body, is somewhere encreased with fleshy Fibres, and be-
 generateth as it were into a Musculous substance, all whiche is now to be ap-
 proued and verified in the skinne of the forehead, which to be endewed with vo-
 luntary mouyng who doubteth to be needfull. For the eyes open largely by
 drawyng bpward the browes, and that when the partie at one instant desireth to
 see many thynges, and do shut agayne by the constrainyng and bindyng together
 of all the partes circumiacent. To both those vles therfore nature hath bestowed
 voluntary mouyng, ech where on the skinne both about in the forehead, and be-
 neath in the chekes, to the end that sometyme by extension and stretching, other-
 times by replication and enfoldyng therof, within it selfe, the eyes may both o-
 pen and shut, which that it might be done, because no part without Musclic hath
 voluntary mouyng, by Nature benefite the substance beyng vnder the skinne
 of the forehead and nose, is made Musculous. For the fleshy Membran (as is sayd)
 beyng here made Musculous, is also encreased whiche very many fleshy Fibres,
 and store of braunching sinewes lent fro the brayne, as is not obscurely taught in
 the History of the Perues. Furthermore this Membran of the nose and forehead
 is to the skinne more fast, and holding (without the interuenture of any fat or ve-
 ry small) then in any other part of the body: so that it seemeth as if the Membran
 & skinne there were made one body. Which is so put into the mindes of some A-
 natomistes, that they suppose the skinne of the forehead to be of carneous and
 Musculous substance and the seruyng Muscles to those partes are many.

First, y. sited in the forehead, rising from the superiour part, doe end in the
 inferiour part, in the common seame that seuereth the bones of the head from the
 Bones of the vpper saue. Moreover the Fibres of that Musculous stocke, mutu-
 ally lying to the sides, that is from the toppe of the nose to the middest of the fore-
 head, that consisteth betwene the first rootes of the heares and the eye browes, and
 vnto the sides therfore of this place they seeme more fleshy, all runnyng bpward
 (sayth *Vesalius*) with a straight pathe: except a very fewe that chuse an oblique
 rase. But here I marueile how he was deceiued, for *Collambus* hath agaynst him
 these wordes. The Fibres of these Muscles are nowhere straight as *Vesalius* hol-
 deth, but oblique, that is to say from the toppe of the nose towarde the temples,
 and their action is to lift bp eye browes: although neither Galen so well deser-
 uing in the Art of Medicine, nor yet *Vesalius* in our tyme a man of great name
 in the Art of dissectyng, neither any that write before me haue acknowledged
 it. Who, if they had used greater diligence, might as easely also haue found it.
 These y. Muscles occupy the whole forehead, and as much of the temporall Mus-
 cles, as how much they obliquely asseide beside the middest of the forehead, where
 we contract and wrinkle the skinne, as oft as we are much tyred to anger, or
 sodaine admiration: and that so much in some men, as that the eye browes seeme
 mutually to touche together. Whiche contraction of the forehead might by no
 meanes be, if there were but one Muscle onely. For the more perspicuous p^{ro}ofe
 wherof, *Collambus* maketh mention of a certaine Cardinall, in whose forehead
 these Muscles might evidently bene sene: of which, the least sufferynge couulsion
 by the meanes of a wounde, halfe of the forehead moued, the other halfe refused.
 But lettynge this passe, let eche man iudge accordyng to truth and reason, since it
 is aptly to be found without any great ado. For if you take away the whole skin
 of the forehead, in the middest of the forehead you shall see no Muscle, but in the
 toppe of the nose, where the right with the left Muscle is so conioyned, as that
 they seeme there but one, beyng also more fleshy then any where els. Likewise
 the higher that those Muscles ascend, by so much the more thinne and slender
 they become, yet are not the eye browes drawne bpward by the meanes of these
 onely, but also by the helpe of y. Muscles, which hereafter we will describe: be-

1.
Of the Muscu-
lous substance of
the Membran of
the forehead.
Gal. Lib. 2. v. part.

The benefit of the
mouable sinues
in the face.

Gal. Lib. 9. v. part.
The fleshy mem-
bran in the face
hath Fibres and
branches of
Nerves.

Vesal. Lib. 2. Cap. 8.
Col. Lib. 5. Cap. 3.
The Muscles of
the forehead.

2.
Vesalius.

Collambus.
The Fibres of the
y. Muscles
are oblique.

Their situation.

There are y. mus-
cles of the fore-
head and not one
onely.

One of these mus-
cles wounded
halfe the forehead
moueth not.

How the eye
browes are
drawne bpward.

The Muscles of
the nose.

The fourth Booke of the

png not well knowne (as I suppose) of any other Anathomist save *Columbus*.

Also there are ij. dilatng the nose. And although Galen & others haue made mention of the ij. Muscles that serue to dilate the nose, yet haue they confusedly mingled them together with the Muscles of the vpper lippe. Besides these, *Vesalius* describeth y. that serue to shut the nose, and that he imagineth them to lye in the inner part of the nostrils vnder the tunicle that compasseth them within. Which to be so, *Columbus* by no meanes may acknowledge: for how (sayth he) may that be seene, which can no where be found?

The ij. Muscles therfore that dilate the nostrils, spring from the aforesayd seame, so that the rising of them is sharpe and fleshy, mixt with the end of the Muscles of the forehead and downewardes stretchyng or made broader, and carried aloft on the Bones of the nose, to end at the pinnes or wynges of the nostrils. It is almost made ij. square, wherof y. sides are long, but the thyrd short. These draw vppward & said wings of the nostrils, & haue straight Fibres, therfore they dilate: but those which other Anathomistes haue described are a portion of those Muscles which are placed in the vpper lippe. As by & by shalbe sayd. The nose is shut by the muscles assistant to the vpper lippe, therfore not of any proper muscles addicted to no other vse. Which the more manifest to make you vnderstand, note, the whesoeuer we are willing to draw any thing vnto our nostrils, or vnto vs by the nostrils: we are constrained immediatly to pull & draw together the vpper lippe.

There are besides, others almost foure squared Muscles sited in the necke, which beare their office to the lippes seruyng to draw them obliquely downward, and of these Galen was the first inuentor. The substance of them is a carneous or fleshy Membran, begon about the region of cannell bones, and posteriour part of the necke, so as that their Fibres obliquely ascend, and there at length do meete and touch whereas the superiour with the inferiour lippe is ioyned. Wherefore since that these broad Muscles are seruiceable vnto the face, yea although their chief situation be in the necke, yet are they to be numbred among the Muscles of the face, being much coherent with the chinne. And therefore to the openyng of the mouth some much assistant.

The nuber of the Muscles seruyng to the lippes are iiij. that is, y. in the vpper, and as many in the neither. The originall of the superiour Muscles is four a maner of wayes, rising from the extreme Suture of the iugall bone, as also from the same that distinguisheth the first bone of the vpper iaw from the thyrd: the other ij. are brought from the bone of the cheeke, and all go obliquely towardes the lippe, among whiche there is one that cleaueth to the wyng of the nostrils: & for that cause, they would haue it the Muscle, that should dilate the nose. But *Columbus* calleth it a portion of the Muscles aforesayd mouyng the lippe. Not withstanding sayth the same authour, because I will not seme stubburne in my one opinion, for that I haue alway abhorred, if any man please to separate this, & esteeme it to be in the place of a peculiar Muscle, it shalbe lawfull vnto him for me, which being graunted, then there shalbe iij. Muscles of the nose, whiche all shall serue to dilate the same.

The other ij. constitutyng the neither lippe, do spring from that part of the chinne, where is a certaine conspicuous asperitie, or roughnes in the bone. But now the Fibres of these foure Muscles are diuers myxed, and enfolded within them selues: and therefore (as Galen rightly hath noted) show diuers sortes of mouynges, being for the most part mingled with the skinne.

Vnto the sayd Muscles come other y. of the cheekes, sited betwene both the iawes, both springyng from the gummes, and also endyng in the gummes. Therfore where it pleaseth you it is lawfull to appoint the beginnyng, that is to say, whether aboue, or beneath, it so ceth not. They be sufficient sclendor, and in the

There are not ij. Muscles seruyng to shut the nose.

The exorture, progress, source and end of the Muscles of the nose.

How the nose is shut.

Two broad Muscles in the necke.

Substance.

On.

The lower Muscles of the lippes rising.

The cause of exorture in such as would haue the nose dilated by a Muscle. Lower Muscles of the nose.

The exorture of the ij. Muscles constituting the neither lippe. The varietie of Fibres maketh varietie of motion.

Two Muscles of the cheekes.

the maner of a circle intersected with diuers Fibres, and therefore enuolued with diuers gistes: for like handes they serue to thrust the meate hether and thether, not vnprofitable in tyme of speach, when we will either puste vp the cheekes, or blow forth the breath. A further vtilitie of these Muscles, is dayly proued of the that with trumpets, and shalmes do dayly exercise their blast.

There are y. Muscles, yet hether to be requied and brought to light which negligence (before my authors tyme) hath passed. They are to be seene in the posterioir part of the head, rising aboue the Paramillar Processes at the Lab-dal Suture. They are in forme triangled or y. square, and ending in the fleshy Spemizan, which also admitteth the Muscles of the forehead. Neither are their vles and vtilities (in drawing the forehead and skinne of the head toward the hinder part) to be neglected, as I suppose it both in every man. And *Collum-bus* (besides *Iohannes Anthonius Platus* his master, whose skinne of the head he reporteth every where and evidently to moue) sayth likewise, that in him selfe beeing bald it is most perspicuous.

But to come vnto the eyes, the Muscles of the eye liddes are vi. in number, that is to say iii. on either side. Whereof y. are situated without the compasse of the eyes whiche most certainly may be supposed to be the onely cause, why all Ana-thonisttes (before *Collumbus*) were so deceaued, in supposing those sited within the compasse of the eyes to serue not to the eye liddes, but the eyes.

The first therefore are round compassing, hauing also circled Fibres. They spring in the great corner of the eye, in the common suture both to the head & upper laboe. Their begiynnyng is sharpe, but are dilated vward toward the forehead, in which place they are mixed together with the Muscles of the forehead. Afterward stret- ching toward the eare, the nearer they come to the lesser corner of the eye, the more they are amplified, and downewardes reflected about the roundell, of the eye, that at length neare to there begiynnyng they might finish with a sharpe end. And these are made strongly to shut, and bynde together the eye liddes, whose force we dayly proue when we winke, to prevent any outward iniurie.

The second are y. streight Muscles, broad and fleshy in y. superioir region of the eyes, begiynnyng within the roundell at the visible Serue like vnto the other Muscles of the eyes. These Muscles do cease with a litle broad end in the vpper eye liddle, and their office, by drawing the eye liddle vward, is to open the eye.

The third Muscles seruing to open the eyes, are in figure round and slender, springing from the same place as the aforesaid: doe end towardes the great cor- ner of the eye obliquely in the eye liddle with a tendon almost round. Though a portion thereof in some men is inserted to the tunicle corner, for that they are thought to helpe the mouing of the eye vward: but for this vse they are especial- ly ordained, that is, to draw the liddle vp, and open the eye.

Herein rashly iudge me not (gentle Reader) that I seeme wholly to subscribe vnto the sentence of one mans opinion, for therein thy selfe shalt, but seeme more affectionate to *Vesalius*, then equall in iudgement, and more figne to *Galen* his authoritie, then desirous of the true light. For I follow not *Collumbus* fantasti- cally, but omitting to say what due proues I haue often made of many his asser- tions, I am forced to subscribe vnto him in sondry places, since nothing then truth may be truer. And other places as this which I was not able to search, I haue fol- lowed for his likely reasons. And sure my hope is, that thou shalt scape asmuch commoditie (friendly Reader) by the description of such partes as here by hym I haue inferred, as by any Anathomist that ever writ before him. For among the Muscles of the eyes all the Anathomisttes before account the foure last recited. Which he approueth seruiceable to the eye liddes, as you haue hard, although they be situated within the compasse of the eye, whiche he suspected to be the

D. y.

onely

The posture and end of the Mus- cles of y. cheekes are conuised. Foutme. Fibres. and y. lide.

Collumbus noted. The Muscles to the eye browes of none before *Col- lumbus* noted. Foutme. and y. lide.

The Muscles of the eye liddes are six.

The cause of cir- cular in other ana- thonisttes.

Foutme. Fibres. Situation.

The Muscles during the eyes

Muscles opening the eyes.

The Muscles drawing the eye liddle.

The error of *Col- lumbus*, and y. other Anathomisttes.

The fourth Booke of the

onely cause of their error.

The Muscles of the eyes.

No vertue without his proper organ.
How necessary moving is to the eyes.
Gal. Lib. 10. vi. part.

The motion of the eyes is arbitrary.

Authors in the muscles to the eyes not agreeing.
The intent of the author.
Truth is the most ancient author.
true.

Gal. Ibid.
The description of the Muscles of the eyes after Galen and Vesalius.

Vesal. Lib. 2. Cap. 11

But to make regresse, it followeth yet further to prosecute the eyes, I meane, to describe the Muscles appertayning vnto the mouyng. For no man may deny the eyes (which are so copiously endued with voluntary mouyng) to haue Muscles to them at ech poynt seruiceable, since no vertue is boyde of his proper organ. But contrariwise if the eyes were without Muscles, so were they also without mouyng, & beyng immouable, we should perfectly see but few thynges, and those straight forwarde. For perfect sight is had of nothing neither bywarde, downewardes, sidewayes, nor obliquely, but the rectitude of the apple of the eye guided and moued accordyng to the will of the body which is voluntary: as eche motion els of euery exterior part and visibill member.

But to say what Muscles, and what number of them are seruiceable vnto the eyes, for asmuch as neither in this do the Authoꝝ accord, I shalbe perhaps misliked agayne for swaruing so much from the auncient Authoꝝ: yet vnto the wise I meane to giue no such occasion. For in expꝛessing of both, I leaue vnto euery one that readeth the best to be chosen. The circumstance therfore equally wayed, yeld auncientie vnto the truth whether the Authoꝝ therof was first or last.

The eyes therfore hauyng foure maner of mouyngs voluntary (sayth Galen) as one byward, an other downeward, and other is to either side, it is mete they had as many Muscles also as guides of their mouyng. Wherfore there is one resident in either side of the eye, and the other two placed one aboue, and an other beneath: for all these beyng dissolved into sinewy Filamentes, make one circle of a broad sedon endyng in Iris. But besides, that the circumaction of the eye might be the surer, Nature made two other Muscles and placed them in oblique sorte, one in one eye hidde, and the other in an other, extended both aboue, and beneath towarde the lesser angle or corner.

Furthermoze of these six Muscles, the first iij. euen as they yeld straight motions to the eye, eue so are their seates accordyngly set straight, and all ech where answerable one to an other. The heades of them haue their begynnynge, as from the hard Membran of the brayne, coueryng the visibill Perue, and from the sinew of the second payze of the brayne, immediatly after the commynge forth of the visibill Perue out of the Scule. Mozeouer their belly is moze ample and large, then deepe and profound, yet in sight is most round, lying to the posterioꝝ region of the eye and visibill Perue, after the longitude of it in goyng from the Scule vnto the rote of the eye: and whereas the same belly appꝛoacheth neare the middle seate of the eye where it is broadest, there it maketh an end with a broad Membraneous enervation. Which is in deepe beyond the middle part of the eye, and directed to the hard tunicle therof, like as if it were to the mouyng of a bone: but beyng brought after the longitude of the body of the eye: it is settled to the line neare Iris or the greater circle of eye, as in the former part of the eye appeareth separatyng the blacke from the white.

Agayne, the Muscles of circumduction, or they that lead the eye about are in fashion lyke to the first, and also in begynnynge, yet lesse, and in the manner of their situation and insertion differyng from them. For the first hath his begynnynge from *Dura Membrana* clothynge the visibill Perue from the region of the lesser corner, and is inserted to the lower seate of the eye with his sinewy thinnes, and with an oblique lyne neare to Iris after the manner of the rest. The other spryngeth from the Membran of the visibill Perue, out of the region of the greater angle of the eye, and sustayneth his sinewie tenuitie to the hard tunicle of the eye, with a moze crooked lyne, at the vpper seate of the eye. Whereby it appeareth, that the Muscles of the eye do varie among them selues onely in situation, and by insertion to the hard tunicle of the eye. For the iij. first (as is sayd) are

are wholly straight, and with a more straight line inserted. The other ij. more crooke, or stopwise, attempt their insertion with an oblique line. Which although they are awayable for circumuersion, yet besides they moue the eye both vppward and downward.

Further those Muscles together whilest yet they obserue their proper place, are reckned in figure like a Beare made sharpe beneath and broad aboue: whose sharpe end is their begynning, but the broad part or seat, their insertion. In their short space they are knit together to the visible Perue, conteyning in the capacite (which by meeting together they make) much hard fatte, which other where, in the description of the eyes we haue spoken of at large. Briefly all these sayd like Muscles, produced from the hard Membran of the brayne, courrying the visible Perue, or in compassed sort inserted with Membraneous tendons in the anterior seat of the hard tunicle, neare to the sides of Iris. The first therfore, which is in the great corner, draweth the eye inward towardes the nose: the second lying in the lesser angle, leadeth the eye there towardes: the third lying beneath, bringeth it downewardes: the fourth aboue, toward the eye browes: and the fift, and sixt circumuerte, and turne the eye about ech way.

Besides those vij. Muscles, there is yet an other great one hid on ech side by the others, and compassed about with the aforesayd fat. This sheweth the same likenesse that the other vij. do figure together: for from the hard Membran moving the visible Perue, it hath his begynnyng, but somewhat more forward than the first six. His begynnyng is fleshy, as the rest of the bodye therof, that round compasseth the visible Perue, and being stretched forth from the begynnyng to the foure partes like a Beare or pine apple, increaseth, and enlargeth by litle and litle vntill it touch the posterioz part of the eye, whereto it is emplantad as a circle. Neither doth it assay this insertion neare this visible Perue, but almost where the eye begynneth to encrease the largest. This Muscle lifteth the eye vppward, and downward, and therewithall turneth it.

Hetherto (as briefly as I might) thou hast to consider of the Muscles of the eyes, abstract sensibly from Galen, Vesalius, and the rest of Anathomistes, who all described the eyes of beastes, & not of men. Because I will be purged of all superstition of partiall iudgement, thou shalt thy selfe (friendly Reader) discusse the case, and since both the wayes are layd before thy face, see if thou canst separate the eye of man from beastes: the worthiest of both being most diligently practised by Columbus.

Who in steade of iiii. Muscles which they attribute to the eyes, accompteth x. sufficient to them both, that is, for seuen, sitte in euery eye: neither are those iij. placed (as appeareth) most fit for the opening of the eye liddes, to be numbered at all amongst the Muscles of the eyes. But there are iij. long Muscles, which appeare towardes the rote of the visible Perue, hauing straight Fibres, and end in sinewy tenuities, and are knit in round compasse to the Membran corner, there constitutynge an other Membran, which is not so farre extended as to touch Iris. They are placed like foure corners, wherof ij. aboue, the rest beneath. And these Muscles either vppward, or downward, from the right side, or from the left do turne the eye, that is to say, when any of them by them selues, or a sinder do labo, els ij. at once. But if altogether worke with a subsequent moving then turnes the eye in circular sort. Neither estimate this as a new saying, since the like is proued in the iij. Muscles seruyng to the wrist of the hand. Whereouer they are made to stay the eyes, that is, when alke at one tyme do worke together.

And the fift Muscle, whiche onely he and first of all inuented, is thus described. It is sited vnder the other iij. betwene which, and this, the fat is entercedent. It is placed ouerthwartly, and completeth the halfe of the eye: it springeth

Galen. lib

33
33
33
33
33
33

Col. Lib. 5. Cap. 9.
The description of
the Muscles of
the eyes after Ra-
aldus Columbus.

How 8 Muscles
of 2 eyes are situ-
ated to moving.

Subsequent mo-
uing that is, one
Muscle follow-
ing another.
How the circled
moving is made.

How the eye is
stayed.

The fift Muscles
of the eye newly
inuented.

The fourth Booke of the

A conjectural
knowledge of the
motion of the eye
M.

Collumbus here
busheth into a be-
bement desire to
know this me-
wulous Aquile.

Vesalius and Galen
described the eyes
of beastes.

Muscles of the
eares.

The Muscles of
the eares in man
are very rare.

Plinie. Lib. x. Cap.
17.

The Crocodile
moueth the vpper
iawe onely.

Col. Lib. 1. Cap. 8.

Lib. 5. Cap. 2.

Col. Lib. 1. Cap. 9.

The Popiniaw
streteth both at
once.

This voluntary
mouynges of the
nether iawe.

The Muscles to
the nether iawe.

The temporall
Muscle.

geth from the Membran corner, and also endeth in the same. So that, which is the end, or which is the beginning, it is not easie to finde. We therfore iudgeth it a Muscle maruelous, both begynnynge at the eye, and also endynge in the same: so that it is hard to say what is the proper mouing of this Muscle of the eye. Yet (sayth he) if the begynnynge of Muscles should procede from Perues. I durst then truly affirme the begynnynge of this Muscle to be in the middest, for there goeth in a notable branch sufficient thicke (if it be compared vnto the Muscle) brought from the second coniugation of the brayne, which Perue I graunt me to haue ofte suspected to be the tendon of this Muscle: & this Perue if that you draw, the eye turneth vpperward and round about, although the Muscle be vnder it. And peradventure this is the vse of that maruelous Muscle, that by the helpe therof we behold the heauens, and worke of his Diuine maiestie, whereto we be bozine, to the fulfilling wherof, this sayd Perue is no litle, or meane helpe. This same Muscle thus described, hath on the side (for it forceth not now whether you call it the side end or begynnynge) a litle broad tendō, wherewith it cleaveth to *Cornu*.

Truly I could now wishe that some great searcher of natures secrettes were geuen vnto me, of whom I might learne the vtilitie of this excellent muscle. In the meane tyme it is sufficient, that I haue inuented and described it. I speake now of man; for *Vesalius*, and *Galen* haue described the eyes of beastes, and not of men. As whosoever conserueth their descriptions with the thing it selfe, shall easely know.

Betweene this and the other is fatnesse, lyke as betweene it and the vpper Perue: but that the muscle which *Galen*, *Vesalius*, and others haue described, accomptyng it now in the first, and then in the seventh place, is no where in the eye of man to be found, and may be deuised into iij. muscles of inoe: yet not withstanding they haue elegantly described it, and so, as in *Oren*, *Holes*, *Meathers*, and such like fourefooted beastes is easie to be seene and found. Thus far *Collumbus* of the muscles of the eyes, which I now commit to iudgement, hauing done my part therein with sufficient prolixitie.

Now it seemeth time to go forwardes with the Muscles of other partes, therfore those of the nether iawe let vs see how they may be deciphered. For the eares haue no proper mouyng but in beastes, neither therfore any muscles bearyng dutie vnto them. Albeit *Collumbus* reporteth in a certaine man to haue found a muscle springyng from the cheekes, and endyng at the lappe or wyng of the eare, to giue voluntary mouing toward the Anterior part, an other also sometime in the posterior part, procedyng from the Mammillar Process. But surely these in men are so rare as that they deserue no notable description.

The nether iawe not onely in man, but also in all creatures moueth, and not the vpper iawe, exceptyng the Crocodile: who (as *Plinie* sayth) deuoureth with the vpper iawe without any mouyng proper to the nether: and the Popiniaw whom *Collumbus* first espyed to moue both at once. In figure the nether iawe and vpper in man differeth from beastes, the one for the shorynes, the other for the length therof: because so it behoued that beastes in not hauyng handes, should to helpe them, for the receipt of meate in their monthes, haue longer iawes, nature not beyng carefull for their proportion: which contrariwise in man be most round and shor both for the beuty of the face aunswerable to the rest of the body, as also that he hath handes to reach, and put forth at his pleasure, albeit that the Ape somewhat nearely counterfaiteth the same: with handes, and all after a sorte. And there be iij. voluntary mouynges chauncyng to the nether iawe, that is, it openeth, shuffeth & turneth round. The Muscles therof are iij. on both sides.

The first of them is called the temporall muscle, beyng so strong, and famous because it is next vnto the brayne, and hath many Perues inserted thereunto, and

and therefore that deuine Hipocrates in his booke of Woundes in the head, sayth *Dextro Tempore vulnerato, sinistrum conuellitur*. That is, the right temple being wounded, the left is drawen together. Wherefore Nature, not vnadvisedly vsed such diligence, and care towarde this Muscle. It springeth therefore from the first bone of the vpper iawe, from the Cannell bone, from *Frons*, from *Sinciput*, and from the bone of the temples called *Lapidoide*, and occupieth the side of the head euen to the posterio^r part of the eare, and y^e superiour part also by the breadth of iij. fingers endes. The beginning therof is broad and halfe circle like: and albeit the beginning is broad as is sayd, notwithstanding it finally endeth sharpe, and in a strong tendon, fastned to the sharpe Proesse of the nether iawe called *Coronon*, which tendon beginneth sufficient deepe, and inwarde. There is beside an other Membraneous tendon, which maketh the exterior part of the Muscle blacke, & is caried vnder the Jugal bone. This Muscle hath one office, that is to shut the inferior iawe, & the Fibres of it runne from the outer borders to the centre or middle prickle therof. Which thyng is diligently to be noted of all Chirurgians, whilst in this part they enlarge woundes, or cut any other abcesse that infecteth the part, least they happen transuersly to separate his Fibres: which being done, the vse of them ceaseth: which taken away, the life defecteth.

And because that kynd of mouyng which is to shut and breake ech hard thing, needeth force and delue strength, prudent nature besides the tempo^rall, made an other Muscle to lye in the mouth, which is sufficient strong, and springeth from the cauitie contained in the winges of the Cuneall bone, and endeth in the anterior part of the inferior iawe, where the roughnesse is. The Fibres therof are straght, hauing likewise a tendon strong sufficiently, which is endued with the same office as the tempo^rall Muscle, and is thick and short.

The third Muscle is that which is called *Massetores* or *Manforius*, which moueth the nether iawe. It circled so^rt it springeth from the Jugal bone, and from the first Bone of the vpper iawe, but not from the third and fourth Vertebre of the necke, as Galen would. It hath both a fleshy & tendinous beginning, but the end in the inferior iawe is almost iij. cornered. Furthermore it cleaueth to the sharpe Proesse of the same, where it seemeth to ioyne with the tempo^rall bone. This hath diuers Fibres, and therefore moueth the iawe so^rward, backward, to the sides, and in compassed so^rt, being of it selfe sufficient thicke.

The fourth muscle openeth the mouth and iawe, and is very proper chusing two fleshy bellies, the beginning and endlesse, so^r the middle part therof is tendinous: the beginning therof from the Proesse called *Stoides* is fleshy: it is caried vnder the iawe, and vnder the eare: it is in figure round, & long, but not very thicke: it leaueth at a fleshy substance in the midst of the chinne, where a certaine roughnesse is inwardly discerned. Nature made not this so thicke, as those that are chosen so^r the shutting of the iawe. For those two muscles of the iawe being relaxed, which we haue sayd to be sited aboue on both sides, by reason that the nature therof is suffici^ent heauy it enclineth or falleth downward, easely therefore contented with a smaller muscle to open, then w^ere behofull to shut. But the middle part therof is made as a tendon, least it should take to great a rowme: so^r the place was streite hauing therein many organs placed. To conclude, this muscle, when it is gathered together of it selfe, the mouth thereby openeth, and it is therefore the Autho^r, of mouing y^e nether iawe to the inferior partes, as is sayd.

Where *Hyoide* is placed, how it is fourmed, and to what end and vse it was created, we haue not spared to expresse at large in the Hypo^roph of bones. It shall therefore not be in bayne, when thy eye is here, the finger be there. I meane that thou conferre the insertion and situation of the muscles therof, vnto the manner, forme, and fashion of the thyng it selfe, neither in this onely, but through-

Hippocrates.

The rising of the tempo^rall Muscle.

The Proesse called Coronon.

A canent to Chirurgians.

The Muscle lying in y^e mouth.

The Muscle called Manforius or Massetores.

The fourth Muscle opening the mouth.

Why nature made not the Muscle to open the mouth so large as those to shut it.

The fourth Booke of the

The Muscles of
Hyoides.

1.
The first Muscle
of Hyoides.

2.
The second Mus-
cle of Hyoides.

3.
The third Muscle
of Hyoides.

4.
The fourth Mus-
cle of Hyoides.

Lib. 5. Cap. 12.
Lib. 2. Cap. 17.

The use of the 4.
Muscle.

The fourth Mus-
cle serueth not to
lift up the shoulder
blade. witnesseth
also Vesalius.

Of Muscles not
proper to Hyoi-
des.

The utilities of
the tongue.

Substance.

Galen. Lib. 11. v.
Part.

Figure.

Figure.

The Muscles of
the tongue are
nine, or as some
account 11.

1. 2.
The Ligament
which is in in-
fantes to be cut.

The 11. Muscles
attributed to the
tongue

The tunicle clo-
thing the tongue.

out also the whole discourse of Muscles I with the (Reader) to observe the same rule, for the more assured perfection. The muscles therfore that make the mo-
uyng of *Hyoides* are in number viii. that is, iij. on each side.

The first that appeareth is fleshy, thinn, and straight, springing from the in-
side of the toppe of Sternon. It iourneth aboute *Aspera Arteria* and *Larinx*, and
endeth in the inferiour part of the sayd bone without a tendon, hauyng straight
Fibres, and therewithall draweth directly downward.

The second goeth out from the chinne, and endeth in the bypper part of *Hyoi-
des*. This hath no tendon, but is wholly carneous: hauyng straight *Fibres* also,
moueth straight bywardes answerable in the contrary part to that, which next
besoꝛe I named.

The third muscle is subtile, and litle, begynnyng at the Proesse *Styloides* and
endeth in the laterall partes of *Hyoides*: sited obliquely, and serueth to draw by-
wardes obliquely. But the iij. Muscle cometh from the bypper part of the scaple
bone, and ascendeth vnder the seuenth muscle of the head obliquely. It is small &
long, yet neither longer nor leaner then other muscles, if we may credit *Collum-
bus*. Albeit *Vesalius* sayth there are no muscles in the body longer or leaner. It
is ended in the laterall partes of *Hyoides*. It obtayneth the tendon in the middell
like as the fourth Muscle of the inferiour iaw, although Galen would graut one-
ly to that, a tendon in the middell, and to no other, extollying therfore nature as
though she had wrought in the Muscle a rare and notable poynt, which she had
denyed to all others. Onely this cannot be denyed, that the tendon of this muscle,
which we now describe, is not so long as of the other. But the use of it is to draw
this bone obliquely downwardes with a contrary mouing to the third muscle.
Galen supposed, it lifted up the shoulder blade, when as (saith *Collubus*) he slight-
ly marked how impossible it was to be done, or that so small a Muscle springyng
fro *Hyoides* (as he saith) which bone is moueable, should draw or lift up the great
waight of the scaple bone. And these be the iij. payre of muscles properly ser-
uyng to *Hyoides*. The muscles not proper thereto haue thence their begynnyng.
Wherof some to *Larinx*, the rest are stretched to the tongue.

The toung is the worthy organ of utterace, yet, that not all the utilities ther-
to appertaining. For in eatyng, drinckyng, & fastyng the office therof is notable,
and most requisite, the flesh of it is rare, fistulous, & soft. The magnitude ther-
of agreable to the greatnes, or littleness of the mouth. The actulite therof ther-
fore sauereth rightly of the Muscles, thereto seruyng. Of the place no man is igno-
raunt: the fashion therof is long, and more broad then profound and thicke (al-
beit that the toung in thurstyng directly forth becommeth almost or altogether
round) the roote of the toung is thicker then the end: which was prouidently
of nature, because it behoued it to moue swiftly. As the furtheraunce wherof are
ij. Muscles accordingly bestowed, besides his own peculiar substance, which, in
consideration of the substance besore rehearsed, seemeth not proper to be num-
bered amongst Muscles: yet, by an other reason, which is because it moueth volūtarily,
it seemeth not worthy to be seuered fro among their nūber. Which if it be not, y.
more must be added to the number also sayd, so that then we must account xi.

For it seemeth (if so it must be described) ij. muscles, the toung hauyng in the
middell a white lyne, to distinguish the right from the left part, vnder which is
a Ligament in children (oft tymes) requyryng to be cut, because it is an impedi-
ment to their speech, and at first to suckyng. These ij. muscles attributed to the
tongue or rather fourmyng the same, rise from the ground of *Hyoides*, and ende
at the extremitie of the tongue, tastyng the force of euery kynde of *Fibres*: which
also are so intertexed and wouen together, as that one from another, as in other
Muscles, cannot be disioyned. There betwixt the tongue a certaine tunicle,
which

which receiuing of the vertue that is proper to the fourth payze of sinewes of the brayne, purchaseth thereby most elegantly the facultie of tastyng. Therof in like maner is stretched to the tunicle of the Palate, as shalbe declared hereafter, the which tunicle is both common to the Palate, *Esophagus*, and *Larinx*.

Whence the tongue hath the sense of tasting.

The third and fourth Muscle of the tounge which *Columbus* sayth was not knowen to the other Anatomistes, begyn at the middest of the chinne, where be two Asperities or rough places, directly agaynst the roote of the tounge goyng. Where Fibres are straight, the Muscles them selues round, and it appertaineth to their office to thrust out the tounge beyond the teeth and lippes. Neither is it any miracle (as some suppose) that the tounge can doe this without the helpe of any Muscle.

3. 4.

The fifth, and sixth are slender, begynnyng at the Processe *Styloides*, and end in the sides of the roote of the tounge. These haue power whylest both labour, to draw the tounge towarde them selues, but one onely mouyng, draweth it vp to a side.

5. 6.

The vij. and viij. go forth from the Processe of *Hyoides*, and are inserted to the sides of the tongue: seruyng to draw it downwarde.

7. 8.

But the ix. and x. rise from the iaw, and are fixed to the sides therof. And haue propriety now hether now thether to impell and moue the tongue, when we eate, or swallow.

9. 10.

The last muscle is more rightly to be called a confused muscle of flesh, fat, and glandulous matter together, then truly a muscle. It is put in the roote of the tongue, and is brought from *Hyoides*. Beyng in eatyng pleasaunt and swete: as is proued in such creatures, whose tounge is vnto vs among the rest, acceptable sustenance. Neither shall it be here denyed the name of a muscle, for description sake, although (as witnesseth *Columbus*) it be a particle of small price: wherein therfore we will lose no tyme, least the speach of other matters should be ouer long detracted, which are more necessary.

11.

The Muscles in beastes is sweet in eating.

Besides the xi. (therefore) whiche we haue hether to declared, besides these *Nerves*, *Ligamentes*, and *membran*, there are *Veynes*, *Arteries*, and two other *Nerves* begotten of the vij. coniugation, and addicted to this part for motion sake: which for as much as they be collocated woorthely in the inferiour part, great care must be vsed lest together with the Ligament (as oft as it is requisite to be cutte) those also be vniwittingly deuised.

The partes con-
sting of the tongue.

By the Ligament is ment that, which by openyng the mouth, and reflectyng the tongue vnto the palate, is to be discerned vnder the same, beyng made for great vse and purpose. For hereto are firmitied the Fibres of the tongue, beyng in vse as if a bone were giuen to the tongue, and no lesse to them a stabiliment stay, or ground. Forreuer were it not for the Ligament, the tounge sometimes would be gathered to much backward in it selfe, neither beyng once put forth would it be easely drawen backe agayne. Wherfore it is woorthely a bridle vnto the tounge, both forcyng it, and temperyng the same, least it should be either to much plucked together by the muscles (not hauyng therein any bones or other stay) or els being slaked more then mete, might stray out of course. Besides if in the tongue it had bene stretched but a litle way forward, or occupied but a small portion, it should haue pleased the tongue as litle as if it had not bene made at all. Contrariwise agayne, if further towarde the end it had bene extended, then neither to the palate, upper teeth, nor to diuers places in the mouth, the tongue could haue bene stirred. So exacte therfore is the making therof, and with such com-
moderation is it measured, that if you either adde a litle, or diminish a litle, you corrupt the action of whole instrument.

In cutting the Ligament of the tongue what is to be heeded. What is the Ligament of the tongue. Vesal. Lib. 2. cap. 19

The vse of the Ligament of the tongue. The bridle of the tongue. Galen Lib. 11. vfu part.

The prouidence of nature in creating this Ligament.

With strict measure is this Ligament framed. Col. Lib. cap. xiiij.

The fourth Booke of the

What *Larinx* is.
Where voyce is
first sounded.

Of the *Muscles*
belonging to *Larinx*.

Why the author
sometime followeth
Galen and
Vesalius.

Galen and Vesalius
haue described *Larinx*
according as
it is in beastes,
and not in men.

Collumbus.

Col. Ibidem,
Lib. 1. cap. xiiij.
The number of
the *Muscles* of
Larinx.

1. 2.
The first 4. *Muscles*
of *Larinx* be-
longing of the common
Muscles.

3. 4.
The muscle com-
plecting *Æsophagus*.

5.
The opinion of
Collumbus differs
from Galen, and
Vesalius.
Fuch. ex Gal. et vef.

L *Arinx* being the head of the rough Arterie, is the instrument wherein first the voyce is formed, which God the worker of all thynges, hath by marvellous art compounded. The place therof is in the iawes, vnder the tongue and bone *Hyoides*. But since the bones therof (for so *Collumbus* calleth them rather then Cartilages) are before expressed in the History of bones, there remaineth now (because this so necessary instrument, of inspiration, and expiration, as also to the restraynt of euery efflation after the will of the body, stande in neede of voluntary mouyng) to speake of the muscles giuen thereto for the maintenance of his worthy office.

Wherein (that from these my simple labors I may clearly wipe the blotte of error, least by such meanes or infection, they become odious to the hearers, and to me as to the unhappy husband men: who taking gladly great toyle with his ground and tillage, in hope of the harvest recompence, reapeth a sorte of blasted eares mingled with that cursed socle, in stead of the finest flaxen, and whyttest wheate which he trusted surely to had sowed), I am forced to abstayne a while both from *Vesalius* and Galen. Who whilst herein they dissected not the body of man, I know not whether we haue more cause to shunne both their opinions in this respect, or condyngly to commend *Collumbus*, for his integritie: not in finding the fault but for hatyng the fault, neither for reprobuing those authors, but for his endeuour to amend the misse. But of the ij. it appeareth he most marvellously at *Vesalius*, not because his opinion herein is scarce approbable (for who knoweth not the best may sometyme be deceiued) but for that *Vesalius* neuer wared wery to reprehend Galen for cutting Apes and not men, and shewing him selfe herein but a ridiculous carper, to describe & throte of a beast and not of man: neither at all admonisheth the Reader therof. The like negligence is imputed vnto him, where he describeth the eyes, which in man (although the more difficult) *Collumbus* protesteth onely to haue folloved. Wherefore these be his wordes. Parueile not that I (speaking onely of making) do differ from the writing of the rest that haue described & wyndpype of beastes: neither that I meane to resist such excellent men otherwhere, but onely that I might take away those errors (truth being my guide as much as in me lyeth) I am forced chiefly in this argument, to depart from their opinions.

The throte therfore of *Larinx* hath muscles both proper and improper, but those not in number as other haue accompted them, although *Fuchs*. (imitating the mindes of Galen and *Vesalius*) would seeme to speake of the humane *Larinx*. For there be but of proper Muscles ix. and of the common v. being a sentence very dissonant from those that say xij. proper, and viij. common.

Of which the first two spring from the toppe of the breast, whence also the ij. first of *Hyoides* had their begynnyng: they are fleshy euery where, but without tendons, and endued with sharpe begynnings. They are extended about the rough Arterie, and are inserted to the nether partes of the two shield like bones, drawing downwarde: and are much profitable, for that whilst they moue, they bynd beneath, and dilate the wyndpype aboue.

The second common from the sides of *Hyoides*, being likewise fleshy, and (ending) draw neare vnto the ij. first. So are their Fibres in like maner straight. These can dilate the nether part, and bynd together the vpper: and contrary to the mouyng of the first, do lift the wyndpype vplwarde.

Of these (which we haue called comen) the last muscle complecteth *Æsophagus*: adding the deglutition, and swallowyng of meate and drinke. It riseth from the shield like bone, and hath transuerse Fibres follovyng the fourme of a halfe circle, wherewith the laterall part of the wyndpype is coarcted, & stretted together. And this is one muscle and not ij. as Galen and *Vesalius* esteemed, who while they

they had considered diligently, imagined that those muscles spring from the posterior part of *Esophagus*, which is membranous, and soft, and had force to draw together the posterior partes of the windpipe: which is a thing hard, and heavy. Wherefore (sayth *Columbus*) there is nothing in this left whereby to excuse them, when as a great absurditie should be followed, if we should also affirme those muscles to proceede from thence, whose Fibres onely well marked, shall discerie them to be one, and not y. deuisable muscles.

Beside those, *Vesalius* writeth of other y. common muscles, which being almost round, should spring from the middest of the interior part of *Hyoides*, and either of them on both sides inserted to the roote of the body of the liidge, or rather of *Larinx*: hauing the proppertie, and office, as oft as it depressed with meat and drinke, to lift it vp agayne immediatly. Which in an Ox, Cow, or such lyke creatures is very true in deede, but not in man, looke thou neuer so diligently. Thus of the eight common muscles iij. being taken away, there remaineth but v. common they are called, because their begynnynge are otherwhere, and their endes in this part.

The other ix. which are called proper muscles, because they begyn, and also end in *Larinx*, seruyng therfore thereto onely: are made for this cause to open & shut the Epiglottis. For *Glottis* is a long rift placed in the middest of *Larinx*, the which (sayth *Galen*) the like substance is not to be found in all the creatures.

Of these ix. muscles the y. first go forth from the Anular bone, the rest from the nameles Cartilage. They be small, and haue oblique or crooked Fibres, and end at the nether part of the shieldlike bones. They serue to bynd together the nether part, and dilate the vppermost. Neither in this place is to be imagined of any contrary mouyng: for the bones be hard, and being bounde together beneath, it followeth that they dilate & open aboue. The like doth the shieldlike Cristles in beastes. But of these Muscles you shall finde one on the right side, and other one the left, albeit *Vesalius* noteth iij. proper Muscles in this place: of which he beleued the first two to come from the shieldlike Cartilage, and to end in the nameles Cristell. Whereat *Columbus* cannot marvail inough, since (sayth he) the vinnamed Cartilage hath no mouyng at all, but must needs haue had if these should come to it: for euery Muscle woorketh towardes his beginning. These iij. Muscles (sayth *Vesalius*) that is two on eche side, are very like the muscles called *Intercostrales*. But that is denyed not onely in man, but also in beastes to be founde true.

But those second Muscles sited in the hinder partes towardes *Esophagus*, are long and fleshy, deriued from the posterior and laterall part of the Anular bone, & end directly at the fourth and fift bone by a tendon: that is, in the inferior part: where it is coarticulated to the third bone. The end wherfore they were created hauing straight Fibres, was to draw straight, and to dilate the aforesayd rift called *Glottis* towardes the laterall part. Which is oft shewed by the benefit of these y. muscles. Wherefore by their office, ech grane or bace voyce is uttered.

The third muscles came from the fore part of the Anular bone, and being oblique, are found to end at the fourth and fift bone, neare to that part where the second y. do end, and not in the shieldlike Cartilage, as *Vesalius* would. These haue power to bynde the fore partes of the rift, and dilate the hinder partes.

But the fourth muscles begun at the inner partes of the shieldlike bones, with which they coarticulate, and go obliquely, untill they are entred into the sayd bones which construe, and make *Arytenoides*, that is to say, in the laterall or side partes. These also when they make streite the anterior partes, do amplifie and enlarge the posterior.

The last muscle of *Larinx* is so small, that a lesse in the whole body besides

Lib. 2. Cap. 20.
The other y. common Muscles which *Vesalius* writeth are not in man.
Col. libid.

Why they are called common Muscles.

The nine Muscles of *Larinx*, which are called the proper Muscles thereof. What *Glottis* is and where it is.

1. 2.
Of the nine Muscles of *Larinx* whence the first doe springe. The Anular or ringlike bone.

Vesalius erreth in the y. first Muscles of *Larinx*.

Every Muscle worketh toward his beginning. *Vesalius*. Ibidem. *Columbus* denieth them to be like the *Intercostrales* Muscles.

3. 4.

How grane or bace voyces are uttered.

5. 6.

7. 8.
The 4. muscles of *Larinx*. The constitution of *Arytenoides* expressed in the picture of bones where *Larinx* is described.

The fourth Booke of the

The last and least
of all 8 Muscles
of Larynx.

Howe Vesalius
reckoned 12. Mus-
cles to Larynx.

The authors good
will to his coun-
trie and by them.

Suspend your
iudgement till you
see the truth.

Of the Muscles
of the shoulder
blades called cla-
uiculae scapulae.

Gal. Lib. de Musc.
Col. Lib. 5. Cap. xv.
Vesal. Li. 2. Cap. 16.
The number of
the Muscles of
the shoulder blades.
The 4. motions
of the shoulder
blades.

The first Muscle
of the shoulder
blade, like a
Monkes hode.

The diuers mot-
ions of this obli-
que Muscle.

The hoddlike mus-
cle in man is not
deuided, as in
Apes.

Collumbus Ibi d.

By the benefit
of the third Mus-
cle the shoulder
blade is lifted up.

may not be found, it is placed ouerthwartly in the roote of those ij. bones which we last remembred, hauing ouerthwart Fibres also, like those of the last of the common muscles which embraceth *Esophagus*. This muscle thus described, hath libertie in bindyng together the posterioir parte, there withall to dilate the Anterior.

But *Vesalius* by accompting the first ij. proper, iij. and this last one, ij. made by the number of his iij. But since that, *Collumbus* firmly auoucheth it to be but one muscle and to haue continual Fibres. As for my peculiar Ligamentes to this part, there is none, beside membranes enuicapping round the ioyntes.

Thus farre of the vocall organ, in describyng wherof as appeareth, is great dissention amog the Authors. But for my part, and that my labor might be more frutesfully employed, I haue endeouored to folow him that sheweth likeliest at y marke. Be sapient therfore Reader in iudgemēt, & not captious in caruing a fault, least it, beyng not acceptable to his appetite thou geneest it vnto, be restored to thee agayne with blame.

It hath pleased others to entreate next of the muscles mouyng the head, but *Collumbus*, because the greater part of them is contained vnder the muscles of the scapula bones, determined first to speake of these, and after them of the muscles of the shoulder, before he declared how the head is moued.

The muscles therfore of the scapula bones (after *Galen*) be in number viij. on each side. Albeit the truth is (if *Collumbus* and *Vesalius* were worthy profes- sors) that by foure, each shoulder blade is moued. And iij. maner of mouynges are appertinent to the scapula Bones, as vpward, or towarde the head, downward, forward, & backward. That which *Collumbus* willeth to be the first, *Vesalius* describeth the second, & the second after *Collumbus*, is the first with him: but it forcerth not it is sufficient onely that they agree in their proper descriptions.

The first therfore hath the most rare and notable figure of all others in the body. For, being copared together with his fellow, it may not vnaptly be likened to a monkes hode, and is therfore without any absurditie called *Cucullaris Musc.* It cometh forth from *Occiput*, and from the toppes of the ridge of all the Verte- bres of the necke, and downe to the viij. Spondill of the brest: but in the hinder part of the head it hath an ouerthwart lyne, occuppyng the whole space that lyeth betwene *Occiput* and the eare: the begynnyng therof is sclēder, and so farre from *Occiput*, as to the viij. Vertebre of the brest, and endeth in the Processe *Acromion*, and to the broader part of the canell bone. This muscle beyng compounded with diuers kyndes of Fibres, sheweth likewise diuers maner of mouyngs. For, by the meanes of the oblique Fibres of the vpper part, it draweth the shoulder blade ob- liquely vpward: by those in the midst, the same is led towarde the backe: but by the inferiour Fibres, it plucketh downewardes. It is very notable in fi- gure, and accordyng to the raritie of his shape obtaineth a rare & peculiar name, that is a hoddlike Muscle, or more seemely in Latin *Cucullaris Musculus* as afoze sayd. Which *Galen* deuided into ij. so it is reported to be in Apes.

The second Muscle dedicated to the scapula bone, lyeth vnderneath the first Mus- cle of the shoulder, and springeth from the second, thyrde, fourth, and fift, but sel- dome from the vi. ribbe, and endeth at the lesser Processe of the scapula called *An- cyroides*, both fleshy, and tendinous. Nature begat it to this vse, that by meanes therof the scapula bone might moue forwardly towarde the brest bone *Sternon*: but is nothing seruiceable to the shoulder, what soeuer *Galen* thought therein.

The thyrde Muscle is reachd from the ouerthwarte Processe of the second, thyrde, fourth, and fift Vertebre of the necke: and as it fleshy descendeth, so it wa- reth thicker and stronger, and finally is inserted to the vpper and inner part of the scapula: almost all the Fibres therof are straight, except a few that stand obliquely,

or slopwise. And this is used to lift by the shoulder blade, and to give helpe unto the first. For great and heavy is the scaple bone.

The fourth is a broad Muscle thine, and fowlesquare, brought from the ridge of the first, first, and seventh Vertebres of the necke, and from the iiij. uppermost of the breast: it beginneth fleshy, and parteth tendinous, with oblique Fibres: the ende therof is after the hole longitude of the shoulder blade, which is thereby carried backwardes.

Further, the shoulder hath every kynd of voluntary mouyng, as for example, upwardes, downwardes, forward, backward, and round about, to the perfect rulyng wherof nature addicted vij. Muscles,

Collumbus,
Vesalius,

The first wherof is great and fleshy, occupying the anterior part of the breast, and marcheth forwardes from the middest of the Cannell bone towardes the breast Bone, following almost the whole length thereof, and from the Crissels of the vij. and viij. ribbe. The begynnynge hereof is large and great, but it ever after diminisheth, and at length endeth at a Tendon short and broad: which is inserted in the anterior part of the shoulder vnder the necke therof. This Muscle hath diuers Fibres, and therefore leadeth the shoulder diuersly vnto the breast, that is to say, higher, lower, and in the middest betwene both. Galen supposed this muscle to be deuided in iiij. but that is denyed, albeit somtyme that in the nether part therof (as sayth Collumbus) a certaine portion sharpe stretching out, is found in some men as though it were a muscle, when as in deede it is none. But (sayth the same Authoꝝ) to this absurditie he hath added an other more absurd, by thinking the arme to be moued obliquely by meanes therof: which in Apes, and not in man is proued true.

1.
The Muscles of
the shoulder and
the manifold mo-
tions therof.

This Muscle is
not to be deuided
into 4. as Galen
would.

The second muscle of the shoulder is iiij. square, thicke, and intertred with diuers Fibres, and is called by Anathomistes *trapezius*, and *deltoideus*, and *Humeralis*. It springeth out of the middest of the Cannell bone, from *Acromion*, and the whole great Proesse of the shoulder blade: it hath a broad and tendinous begynnynge, but the end of it is sharpe: it is carried aboue the head of the shoulder, and endeth in the middest of the shoulder at a strong and ouerthwarte tendon, which tendon embraceth the middle thiknesse of the shoulder: it consisteth of many Fibres, wherewith the arme is lifted aboue, forward, in the middest, and backward.

But the third muscle of the shoulder is carneous and round, which from the inferior part of the shoulder blade goeth forth which a fleshy begynnynge, with Fibres straight, from the begynnynge vnto the very end: & being situated obliquely, goeth forward aboue the anterior and bunched part of the shoulder blade, and goeth out into a broad and strong tendon, which planteth it selfe in the posterior part of the shoulder: and it is the part of this muscle to draw the arme downward towardes the posterior partes.

The fourth muscle is great and broadest begynnynge at the point of the ridge of the vi. Spandill of the breast, and descendeth by the point of all the inferior Vertebres, euen to the halfe of *Os sacrum*. And this so long a begynnynge is esch where slender, but slender, and endeth at a broad, strong, and short tendon vnder the head of the shoulder, neare that place whereto we haue sayd the first muscle cleaueth, that leadeth the arme vnto the breast: betwene which is left the cavitie which we call the armhole. Diuers Fibres hath this muscle, and therefore it is a meane to moue the arme diuers wayes downward, & that rather in oblique sort then in any other kynd of position. It hath iiij. corners vnequally sized, for of them the one is short, the other y. long, and their originall is thus. The short corner is from the first Vertebre, vnto the end thereof: and of the long ones, one stretcheth from this Vertebre, to the halfe of *Os sacrum*: and the other from that place vnto the end therof.

3.
What Muscles
do constitute the
armehole.

4.
ColLib. 5. Cap. 16.

The descriptiō
of the sides of this
fourth muscle.

The fourth Booke of the

The first Muscle occupieth all that cavitie whiche is betwixt the toppe of the shoulder blade, and the greater Proesse therof, springing from the posterioir part of it. It is fleshy, and endeth at a strong tendon, whilst it is caried vnder the Ligament that knitteth the shoulder and the scaple bone together. It endeth in the head of the vpper part of the shoulder, much cleauyng also to the shoulder blade it selfe.

The first Muscle compasseth about the hole Gibbous part of the shoulder blade, but it issueth forth from the posterioir part after the longitude thereof. It is fleshy, much cleauyng to the scaple bone, and endeth in a thicke and broad tendon, which is inserted toward the hinder partes of the head of the shoulder.

To the senenth is dedicated all the inner cavitie of the shoulder blade, where it cleaueth and lyeth to the ribbes: but it is begotten from the whole posterioir part of the scaple bone. So that it is situated betwene the ribbes, and the scaple bone: and the end of it is a Tendon sufficient broad, inserted to the inner part of the shoulder.

And finally these iij. Muscles, whiche I haue last made mention of, were ordained to the end that the arme might not want the power of circumaction, although the first (sayth *Vesalius*) seemeth somewhat to helpe the eleuation, or lifting vp of the arme.

Thou hast (Reader) to vnderstand by this word, shoulder, lately described, the mouyng that is geuen to the vpper bone of the arme, & that is the most proper terme for it, for the same bone in Latin is called *Humerus*, which in English is shoulder, although in our domestickall phrase, we say the shoulder, when we meane the highest part aboue the arme, which in daede is the Proesse of the scaple bone called *Acromiō*, in like sort, as by the arme we meane both the shoulder bone, and cubite. Thus for thy better satisfaction.

Now as it followeth. The head is moued by a first, and secondary mouyng. By the first mouyng is vnderstode the mouyng of the head with the first & second Vertebre, but the secondary mouyng is when it styreth together with the whole necke. It hath iij. proper mouynges, as one forward and backward, another to each side, and the thyrde when it turneth round, albeit these may fitly be reduced into two, as into a straight, and an oblique mouyng. The straight with the first Vertebre, the oblique vnder the second is brought to passe: what soeuer Galen sayth to the contrary, of whose confutation in this matter for the mouyng of the head, read before in the History of bones: where is described the first, and second Vertebre of the necke.

The Muscles seruyng to his proper mouynges are seuen on each side.

The first springing fro the Spine of the superioir Vertebres of the brest, ascending by the Vertebres of the necke, vnto the thyrde, are afterwarde deuided, & runne slopwise towardes the hinder part of the head, where they end betwene the posterioir part and the eares. Their Fibres are straight from the begynnyng, vntill they come to the place where the Muscles are deuided: but afterwarde as they stretch vppward, so farre their race is a slope, or oblique, and sufficient fleshy are these Muscles. Their office is whē both laboꝝ with one consent together, that the head might be drawne backwardes to the posterioir partes, but when the one worketh onely, then is the head compassingly turned to the one side. To those Muscles are thre sides, one from the begynnyng to the place whereas he is deuided from his fellow, another from thence to the hinder part of the head, and the thyrde from the hinder part of the head vnto their beginning.

The second Muscles are diuers, because they haue diuers figures and impressions, consisting of many partes tendinous, and very many fleshy: so that some suppose them to be five Muscles. Although in daede it is but one paye, as one would

The arme turned about by the first, seere, and seuenth Muscles of the shoulder.
Vesal. 2. Cap. 23.

What is meant by the shoulder as also in the history of bones is not omitted.

The Muscles of the head.
The head is moued with a first and secondary mouyng.
The proper mouynges of the head.

The fall of Galen.
Col. Lib. 5. cap. xvij.

The number of the Muscles to the proper mouyng of the head.

would say the right, and the left. They spring with a sharpe beginning from the transuerse, or ouerthwarte Proesse of the fourth and fift Spondiles of the brest, and ascendyng upward, are at length fastned in the middest of the hinder part of the head. Their situation is directly straght, & their office is to draw the head to the posteriour part straght.

The thyrd Muscles are slender, whiche spring from the ridge of the second Vertebre of the necke, and end at length in *Occiput*, which is the hindermost bone of the head, but by the way, they go somewhat disioyned. The Fibres which they possesse are straight, therfore do they lead the head directly backwardes.

The fourth Muscles are hidden vnder the thyrd, and are all fleshy even as the thyrd, but short, and spring from the posteriour part of the first Vertebre, where should haue bene a ridge or Spine vnto the same Vertebre, but that nature took it away because it might be no impediment or greuaunce vnto the essence of the thyrd Muscles. In the middest of *Occiput* is their end, and their office is to draw likewise the head backwardes directly. Neither is it any maruaile, why nature ordained so many Muscles onely to draw the head backwardes, for so it was necessary: since the Anteriour part of the head is much more heauy because there to is ioyned both the face and nether iawe. Whereby the forepart becommeth of right heauyer then the hinder.

In oblique sort are situated the fift payre of Muscles mouyng the head beyng risen from the Spine of the second Vertebre, and ended in the ouerthwarte Proesse of the first. These Muscles are slender and all fleshy, seruyng to pull the head in round compass together with the first Vertebre.

The vi. are also oblique, but contrary wayes they make & fourme of a triagle, & they begyn at the Proesse of the first Vertebre, so do they end in the hinmost bone (*Occiput*) of the head, and that in the middest: these draw to the fore partes.

So these y. last recited the v. & the vi. are the proper Muscles which moue the head round or in compassed sort, by the helpe of the first Muscles, and the last which yet are to describe. But now therfore they whiche are in the vii. place are long, round, and strong, sited obliquely. Their Fibres spring from the toppe of the brest and Cannell bone. They haue ii. begynnynge, betwene which lyeth a concauitie, or spare hollow. They are sinewie and broad in their begynning, after also fleshy, and are planted to the Mammillar Proesse, which they imbrace. When both of them labor, the head enclineth forward, but as oft as onely one of them moueth, the head goeth to the side. They are further very strong, and able also to bow the head directly downward. But this more ouer is to be noted, that these Muscles together with the iiij. Muscle of *Hyoides*, do make a great crosse in the necke. These hetherto are proper Muscles seruyng to the first mouing of the head.

Now to the secondary mouyng, whiche is atcheued by the Muscles of the necke, which mouyng, the head cannot but moue. And the necke it selfe moueth bothe forward, and backward, and to eche side: and the Muscles thereto are on eche side foure.

The first beyng placed in the forepart, produced straight from the body of the fift Vertebre, of the brest, neare to the place where as it is knit with the ribbe, and in ascendyng it is knit to all the bodyes of Vertebres, saue that the middle part by which *Esophagus* iourneyeth they leaue vnscuered. These are the Muscles whiche are called *Latitantes sub Esophago*, that is lurking vnder the stomacke: and these bow the necke towardes the Anteriour partes. And note that these last recited Muscles are sometyme (though that very seldome) knit vnto the hinder part of the head, or *Occiput*, where the hole is, through which the Spinal marey descendeth.

The second beyng large and fleshy, spring from the first ribbe, but ascendyng,

P. iij.

becom:

Why nature appointed so many Muscles to the drawing of the head backward.

What Muscles doe make a crosse in the head.

The secondary mouing of the head.
The Muscles of the necke.
Their number.

The Muscles lurking vnder *Esophagus*.

The fourth Booke of the

becommen so narrow as that they fashion not so much as a triangle. They are supported by the transuerse Processes of the Vertebres of the necke in the Anterior part.

The thyrd paye hath his originall from the roote of the transuerse Processes of the vi. Vertebre of the brest, and ascendyng vpwordes also from the other transuerse Processes of the Vertebres of the brest, are at length knit to all the Processes of the Vertebres of the necke, in the posterior part. Their office is the like with the second before named, that is, to bow the necke directly to the shoulder blades, or sides: as when both of them moue at one tyme: but onely, styreth it obliquely. Betwene these two Muscles go forth the Perues, produced from the Spinall marey, betwixt the Vertebres of the necke.

The fourth begynnynge at the vii. Vertebre of the brest, goyng aboute all the ridge or Spines of the brest, and necke, do at last end at the Spine of the second Vertebre of the necke, and obtained they were to the drawyng of the necke to the posterior partes.

Next now followeth the backe, which is moued with diuers motions, and (generally) that is foure simple: as flection, extention, and inclination to the right, and left side. To the atcheuyng of which motions it behoued that nature created viij. Muscles. That is foure on each side.

The first come from the superiour cavitie and the posterior part of the bone *Ilium*, as also from the superior, but interior part of *Os sacrum*. Their beginning is broad, and fleshy, ascendyng in the inner part of Abdomen, and cleaue to the transuerse Processes of the Vertebres of the loynes, and to the lower ribbes: they are all fleshy, and in figure foure square: and when both of these moue together, they can bow the backe forward, but seuerally labouryng, do draw it to a side.

The second Muscles are longer then all the Muscles of our body. For they are extended from the lower part of *Os sacrum*, euen vnto the head: their originall is from the extreme part of *Os sacrum*, with a sinewy begynnynge and strong, then after degenerate into flesh, and cleaue to the transuerse Processes of the Vertebres of the loynes, towarde the posterior part, afterwarde to all the transuerse Processes of the Vertebres of the brest, euen vnto the first, to all which transuerse Processes they send a tendon or sinewy hold, in which place *Vesalius* supposed this Muscle to end, but departyng from those Processes, and ascendyng aboute the Mammillar Processe, it endeth in the temporall bone: which part *Vesalius* reckened among the Muscles of the head, albeit thus *Columbus* accompteth it to the second paye of the backe, nether are these made without vse: but bowe the whole backe and head also to the posterior part, whereby the body may imitate the figure of a halfe circle.

The thyrd Muscles spryng from the posterior part of *Os sacrum*, begynnynge sharpe, and are knit to the ridge of the Vertebres of the loynes, and sharpely also end in the ridge of the xij. Vertebre of the brest: though sometyme in the xi. furthermoze they are endewed with sinewy holdes, as before in the other, and they are authorisid to bow the loynes.

The fourth likewise hauyng a sharpe begynnynge, spryng from the ridge of the xij. Vertebre of the brest, and are fastened to all the Spines of the Vertebres of the brest, and sharpely also end in the first: beyng broad in the middelt about the vi. Vertebre: and haue power to erect the brest. And when the thyrd also sayd do labour together, they hold straight all the whole backe. But if foure styre together, as one would follow an other, they moue it in compassed sort. And the Muscles mouyng that be onely on one side, the body then is turned to a side.

The thre Muscles are of the loynes, which the Grecians call *Ψοι*, the thre last are annexed much vnto them, whereby it cometh to passe, that if the Anatho-

mist

Vesal. Li. 1. cap. 3. 2.
The Muscles of
the backe.
Col. Lib. 5. cap. 19.
The number is
viij.

Their vse.

How the body is
bowed like a half
circle.

The vse of the 4.
Muscles of the
backe.

When the whole
body is turned to
a side.

The thre Mus-
cles called Lum-
bals in Greke
Πλοα.

must be not excellent diligent, they are neither easely found, nor distinguished.

Not naturall but voluntary (sayth Galen) is the respiratiue motion. The brest therfore is a part within hollow like an egge, wherein are put the instrumentes seruing to life, and consequently to respiratiō, and inspiration: without the which the life it selfe by no meanes could exist, or stand. But (contrary to the aforesayd Authour) this moueth by nature, as well as by election or choise: as for example when we sleepe, the sure of nature the brest moueth, and not of will, to the which purpose, betwene the ribbes & brest bone are Cartilages put, which easely geue place to the naturall mouing of the lunges: which cease not of their labours, whether the body sleepe or wake. Besides, when we talke or call, then they are more largely moued, because the brest by the Muscles is also more dilated. Of these motions the voluntary is made by Muscles, but the other onely by dilatation and constriction of the lunges. Therfore to this end there are of proper Muscles 8. 1. and 8. common. Which although they be put in Abdomen, and serue therto, yet are they seruicible to the brest also. But heare by the way a notable thing, when we inspire or let in brest, the lower partes of the brest are then dilated, and the vppermost compressed. Contrariwise whilst we expire or breste the nether partes are constringed, and the vppermost dilated.

Of the Muscles of the brest the first two that come to hand, that is on each side one, are produced in the beginning from the inferiour part of the Cannell bone, and with a long end are inserted to the superiour part of the first ribbe: whiche they serue to dilate.

The second Muscle is great, broad, and all fleshy, beginning at the scate of the scaple bone, and goyng betwene it and the ribbes is inserted in the first, second, thirde, fourth, fift, sixt, seuenth, and eight ribbe, and somewhat to the ix. neare vnto the borders of the Cartilages. The endes of this Muscle are lyke vnto fingers, and was made to dilate these viii. ribbes.

The thirde is a small one, coming from the Spine partes of the thre last Vertebres of the neck, and first of the brest, in the beginning broad and Membraneous, but endeth at the first ribbe of the brest and sometyme in the posteriour part of the fourth. And thus was it made of nature to dilate those ribbes.

The iiij. Muscle is also small and iiij. square, brought from the Spine of the ij. last Vertebres of the brest. And sometyme fro the first of the loynes. In the beginning it is broad, sinewy, & Membraneous, but after becommeth fleshy, & endeth in the iiij. last ribbes, after the maner of fingers: so can they dilate those ribbes.

The fift carneous, riseth from the hynder, and vpper part of Os sacrum, and from the inner part of Ilium, cleauing so fast to the second Muscle of the backe, as it may be thought a portion therof. Neuerthelesse when it commeth to the ribbes, it sheweth playnly it selfe to be diuerse from the Muscle of the backe. The higher it ascendeth the slender it wareth, beyng at length inserted by the stay of sinewy holdes, to all the ribbes in the posteriour part, not far from the transuerse Processes of the Vertebres, where the ribbes haue their eminent asperities. These partes constrain and bynde together the hinder partes of the brest.

The sixt is put within the hollow of the brest all after Sternon, and the viij. Cartilages of the true ribbes, it is fleshy, long, and but small: to this vse ordainned, that is, to straiten the anterior partes of the brest.

After followe the intercostall Muscles, so called, because they occupy and possesse the space places betwene the ribbes, and are on each side foure and thirtie. For the spaces be xi. vi. of the true ribbes, and five of the false ribbes, ij. in the spaces of these, and foure in euery one of those. This difference makes, that the Cartilages may be turned towarde the brest. In these Muscles the course of the Fibres is turned. For the outer and inner haue oblique Fibres but in contra-

Of Muscles moving the brest.
The description of the brest.

The brest hath both naturall and voluntary mouing. When the brest moueth naturally. When the brest moueth voluntarily.

What maketh the voluntary mouing. What maketh the naturall mouing. The proper Muscles of the brest are 8. the common 8.

In Inspiration the inferiour partes of the brest are dilated and the superiour constringed.

In expiration contrarywise.

The first muscles of the brest.

3.

1.

4.

5.

6.

The Intercostall Muscles are on each side 34.

The fourth Booke of the

ry sort, for the outer and inner make together the figure of this letter X.

The outer Inter-
costall Muscles.

The beginning of the exterior Muscles is from the lower part of the ribbes, and end in the upper partes of the next following, so that beginning towards the backe, they end at length in the best bone.

The Intercoastall
Muscles on the in-
side.
Fibres.

But the inner beginn from the upper part of the lower ribbes, and end at the nether part of the superiour ribbes.

The Fibres of the exterior Muscles procede from the backe, slopwise towards the best, as it were from above descending, but in contrary manner be the Fibres of the interior Muscles; so that they ioyne, and meete together like crosses.

The error of o-
ther anatomists
in the vse of the
intercoastall Mus-
cles manifested
by Collumbus.

Vesalius hath written that Nature made these thirty Intercoastall muscles on either side and all to one end and straitning of the best. But for that he goeth not vntouched of Collumbus, who proueth how also they can dilate the best: that is when either the interior or exterior separately worke alone. But in deede when all moue at once, then they coast, and make strait the best strongly. For the exterior pull vpiwardes, and the interior downewardes so drawyng, and constrainyng them very hard together. For so ought the force of constriction to be strong, beyng oft forcibly put in vze by sodaine efflation, speech, and vocife- ration. The same Authour inferreth also by what meanes Vesalius was decei- ued. For (sayth he) he supposed in this motion that the first ribbe remaineth not moued. But the matter is playnly otherwise. For it is styred by the first Muscle of the best, which springeth from the Cannell bone: so that when it is lifted vp, it draweth the ribbes after in order: whereto the Intercoastall muscles are assi- stant: and so they are outward extended, the exterior Muscles helppng them: but downeward contrarily by the helpe of the inferiours. For because the last ribbe is drawne downeward by the oblique ascendent Muscle of Abdomen: And after this order also sayd they are dilated. Notwithstanding when that both do worke together, that is the outer and inner, then foloweth constriction of the best generally, as somewhat before is written.

Why the constri-
ction of the best
ought to be strong.
The cause of the
error of Vesalius
in the vse of the in-
tercoastall Muscles.
How the ribbes
are moued.

Diaphragma or Sep-
tum transversum.

There is yet an other Muscle common to both sides, which the Grecians call *Διαφραγμα*, the Latines *Septum transversum*. This devideth the vitall from the naturall partes. Aristotle beleued this diuision to be made of nature, to the end that the vapors of meates and substance receiued, might not ascend by by fumes to the hart, and annoy the same. But that opinion is altogether over- throwne by Collumbus. For as touchyng that matter, if *Septum transversum* were away it forceth not, since the meate hath a close entraunce, and passage into the Ventricle, neither may it by any meanes send, or let passe vapors to the hart: for the substance of the stomacke is not so light and spongy. Agayne if it might, it appeareth the hart should not be offended at all thereby, seyng (for profe,) in byrdes, and diuers creatures, it is naturally wantyng. But to the purpose.

The false opinion
of Aristotle.

Lib. 5. cap. Ri.

This Muscle differeth from all other in the body both in situation, forme, and noblenes: In situatio, as lying ouerthwart the lower part of the best: In figure, beyng round compassed, hauyng in the middelt a sinewy tendon, compassed about with fleshy partes, and dispersed with Fibres from the middelt round about, as a thyng most comely to behold: the noblenes thereof is such as beyng wounded, the partie seldome, or hardly escapeth. And it is sayd that the auncient Anatho- mistes and Grecians called it *Phrenes* whiche is by interpretation the mynde. Plinie, and others after him named it *Præcordia*.

The Muscle dia-
phragma how it
differeth from all
others in the body.
Situation.
Figure.
Noblenes.

Fuchl. Li. 2. cap. 27.

Phrenes.

But besides the sinewy tendon, which before we haue spoken of, and whereby it is partaker of much sense, it possesseth also both Veynes and Arteries, & those not small, but large.

The partes en-
tering into *Septum*
transversum.

So lesse moreouer obtaineth it the sortes of diuers Perues, whiche betwene the spaces of the ribbes do come vnto it from the Spinall marey. Among which are

are iij. cōmyng downe from betwene the fourth and fift *Spōndill* of the necke are solen aboue *Periardinum*, where the fleshy part of *Septum* doth degenerate into a *Tendon*, or rather where the tendon endeth at a fleshy nature.

Fuchsius not in bayne (as it seemeth) describeth therein two circles, which are thus: the middelt beyng *Mēbraneous*, & the outer partes which cōpasse that same moze fleshy. And as it is the nearer to the ribbes & moze fleshy, so & nearer to the centre of middelt, so much the moze *mēbraneous*. In which wordes he meaneth not any dirision therein, but onely speaketh of the middelt and outward partes: as the one moze *Mēbraneous*, & the other moze retainyng of a fleshy nature.

Fuchf. Ibid.
The circles of *Septum*.

Moreover this *Muscle* of the brest ministreth both to expiration and inspiration, that is, puttynge forth the bzeth, and receiuyng it in. Who in vsing this his proper naturall function withdraweth him selfe towarde the *Vertebres*, and ascendyng, draweth to him the extreme partes of the brest, and byndeth together all the inferiour part: all which effect it worketh whilest we expire, or breath forth. But when we receive in the bzeth, it taketh a cleane contrary labour in hand: for then beyng relaxed, and saggyng downward, it suffereth the inferiour partes of the brest to be dilated. And this is the notable vtilitie of *Diaphragma*, as the same Autho^r reporteth to haue beholden in quicke dissections.

Col. Lib. 5. cap. 21.
Septum trāuersum
serueth both to in-
spiration, and ex-
piration.

Whereby very fitly (me seemeth) it may be supposed, that whilest in retaynyng the bzeth it declineth downewardes, the holdyng or straying then of the bzeth receiued, compresseth it hard vpon the subiect partes, very forcibly there-withall compellyng the expulsive facultie: as when we draw together the bellye to the expulsiue of excrementes, we cannot fitly accomlishe the same onely by straying the lower partes, but by enlargyng the brest, and compresyng the middelt together with forcibly retaynyng of bzeth. By whiche meanes *Diaphragma* thrusteth vpon the lower partes: to the end, that in straying the nether bellye by the assistance of the strong *Muscles* of *Abdomen*, none of the intrels might seeke to haue scope or recourse vpwordes, but altogether consentinely forcynge one an other downward, to make a most strong, and certaine exclusion of the superfluous dregges of the thyrd digestion.

How *Septum* an-
neth to the ex-
clusiue of excre-
mentes.

To the better confirmation of this my coniecture *Fernel. Ambian* hath these wordes: The middelt called also an ouerthwarte diuisiō, and a girdle to the body, besides that it is the first instrument of inspiratiō, it helpeth also very well to the vnloddyng of the belly, and drynyng out dregges.

Fernel. Ambianus.
Cap. 8. de Partibus
Hū.

This *Muscle* is clothed both aboue and beneath as with a garment: aboue with *Pleura*, and beneath with *Peritonaeum*. It springeth from the *Vertebres*.

Others esteeme the sinewy part to be the beginning therof. Notwithstanding *Collumbus* ascribeth the begynnyng thereof vnto the iij. litle long partes thereof, which *Vesalius* calleth *Ligamentes*, which litle bodies, come from the side of the body of the iij. *Vertebre* of the brest, and from the vpper ioyntes of the loynes, and from thence afterwarde doth the sinewy part take his beginning, which is ioynted to the *Cartilage*, called *Gladialis*, or commonly *Mucronata*. Which in the History of *Cartilages* is fully described: beyng begotten as a propugnacle to this aforesayd *Muscle*, but not to the mouth of the *Ventricle* as the common trewe of *Whistons* do suppose. And to this part also the hart lyeth.

Col. Ibidem.
The beginning
of *Septum trāuersum*.

*Mucronata Cartila-
go.*

Finally the middelt is fleshy on both sides, and is implanted at length to the *Cartilages* of the false ribbes, embracyng the last.

The perforations
of this noble
Muscle.

Vesalius hath affirmed the perforation of this noble member to be made thre tymes. And it is certain, that it yeloth way to the transiture and course of other needefull partes, for the communion of the vitall with the naturall, and the naturall with the vitall members. Yet it is but twise pearfed, or bozed through, as once by the hollow *Veyne*, which forthwith marcheth into the brest: and the se-

Col. Lib. 5. Cap. 21.
Septum trāuersum
is not iij. times
pearfed agaynst
the opinion of
Vesalius.

The fourth Booke of the

cond tyme, by the stomacke, or nerke of the Ventricle called also *Esophagus*, wherewith likewise do descend two Serues from the vi. payre of sinewes of the brayne. But the iourney of the great Arterie perforateth not this Muscile: forasmuch as whilest it amplexeth the Vertebres, it embraceth it also, but therefore maketh no hole. To this end (therfore) *Fuchsius* sayth that the way of the great Arterie deserueth not the name of a hole, but rather a halfe circle carued out of the compassing part of the midriff, that is when it embraceth the inner side of the Spondiles, there lying the way of the same great Arterie, called in Græke *despñ*, and not the same hole where through *Esophagus* passeth. For stat agaynst that lyeth the testimony of veritie, had it bene the sentence of *Socrates* him selfe, as it was of *Hipocrates* and *Galen*: though no man can say they were men of no Diuine vnderstandyng.

Thus *Septum transversum* is accounted amōg the Muscles of the brest, wherby is shewed how much, and of what efficacy it is in respiration.

But so much as is sayd in that behalfe, tendeth to the sence of naturall respiration. For whatsoever is vehement, or violent, the same is contrary thereto. For if so the qualitie of the heate of the hart do encrease, or occasion serue that, for the speech, or other lyke, larger breathyng is required, then els could well suffice nature, by & by the first, second, thyrde, fourth, and fift, together with the interiour muscles called *Intercostrales* on both sides, do labour wth *Septum transversum*. But if further by bodely causes or sodaine occasion, great and larger respiration be required, as for example to the vse of hollowyng, cryyng, blowynges of trumpets, shalmes, or other vehement efflations, then the exteriour *Intercostrales* are prouoked to moue, which be motions not naturall. For naturall respiration is that which is brought to passe without the helpe of the *Intercostrall* Muscles, and that is it whiche this worthy member sufficiently bringeth to passe: and whatsoever is more, the same hath more helpe, and is naturall, but rather we may terme them necessary for seruyng at needfull tymes.

As to be playne, this is not naturall, but a very necessary kynde of respiratiō, when a man by earnest study or muse vnto him selfe, vpon any earnest or wayghty matter, by tollyng and turmoyle of his wittes, with continuall inward cogitation of the hart, accenseth and heateth more the spirit then naturall respiration is able to temper: then he at a sodaine maketh a vehement inspiration, and after as large efflation, which with indifferent intermission, proueth profitable to coole the kindlyng heate of the hart: a more vehement then that is proued in trumpet, toys, pyppers, hunters, and such lyke exercises. And therfore necessary, though not accounted of *Galen* naturall. Whiche argueth that nature hath created our bodies so carefully, that whatsoever is either naturall, or necessary, it is not wanting. Therfore these Muscles *Intercostrales*, litle used in naturall breathyng yet not to be wanted in extreme efflations, prouoked by needfull causes such as are rehearsed. It is not obscurely proued by this afoze goyng, that the noblenes, and worthy nature of this Muscile may euill be spared in mans body, both for the naturall vse of respiration, as also eiection of excrementes, and it beyng wounded the hart smoldreth, like the lampe that dyeth for lacke of oyle.

The Muscles of the lower belly, that is of Abdomen, wherein are contained & nutritiue and generatiue partes, are in nūber viij. addited to the vse thereof, although they helpe the brest, in dilatyng the same. But if they compresse and strayne together, then serue they to the expulsion of chyldbirth, vrine, and excrementes, chiefly by the helpe of the last Muscile described. And these viij. Muscles lye iij. on eche side, and are thus namely distinguished, iij. oblique, two straight, and two transuerse or ouerthwarte, and of the oblique two are ascendēt, and as many descendēt.

Lib. 2. Cap. 11.

Arteria.
Aorta.

The fall of Hipp.
and Galen.

Galen Lib. de Mot.
Musc. Vltimo.

Septum transversum
is onely & autho:
of naturall respi:
ration.

Naturall respiration.

Efflation.

The midriffe wounded,
death ensueth.

Gal. Lib. 5. Anat. ad.
Vesal. Li. 2. cap. 3. 1

Col. Lib. 5. Cap. 22.
The Muscles of
Abdomen.

Number.

The ij. first to be described are the oblique descendentes so called, for that their originall is from above, and end obliquely, or slopewise in the inferiour partes, their Fibres running the same race: therfore are they called oblique descendents, being broad, and situated in the side partes. They issue forth from the first, seventh, eighth, and ix. ribbe, before they begin to end in a Cartilage, and further from the ribbes following, and the toppe of the transuerse Processes of the Vertebres of the loynes, and from the halfe of the Appendaunce of *Os Ilium*: they haue most broad beginning and fleshy, set out like the fashion of fingers, betwene which endes the second Muscles of the brest do enter, which dilate the viij. ribbes. But after they haue gone a good space sozeward, they degenerate into a broad, sinewy, and Membranous tendon, which cleaueth to the other part of the Appendaunce of *Ilium* and *Pubis*: *Fuchsius* sayth in the hucke bone, but *Columbus* holdeth that opinion as false. In the middelt of the belly they end, that is to say from *Mucronata Cartilagine* directly downe to *Os Pubis*, in which place, is to be discerned the white lyne, where the tendons of these Muscles together with the oblique ascendentes, & the trasuerse are ioyned together. But this part therfore becometh white because there lyeth no fleshy vnder it. Wherfore y^e white line is the end of these aforesayd Muscles sayth *Realduus*, although *Vesal.* hath certified a number that their insertio should be in *Os Pubis*. But such is their vnion of their tendons, as it seemeth to be onely one Muscle haung y^e fleshy partes. But if any man diligently marke the end of their Fibres, he shall playnly finde the ij. Muscles knit together in the middelt, and lying above the other sixe Muscles of the bellye.

The second are the oblique ascendentes, whose Fibres are coursed in contrary sort in respect of the first: for those runne downward, these obliquely vplward, and like as is sayd of the Muscles Intercostales they crosse one another, making the figure of this letter X. These spring fleshy from the Appendaunce of *Os Ilium*, and of the transuerse Processes of the Vertebres of the loynes, in the beginning like a Membran, and going vplwardes fleshy, as knit vnto the lower ribbes. Then afterwarde end in a broad, sinewy, and Membranous tendon, which in ascending, as it cometh to the straight Muscles, denideth in two, whereof the one goeth above the straight Muscle, the other vnder it: wherein the policie, and wonderfull wisdom of nature is able to astonishe mans myndes. For the straight muscles, by being embraced betwene these two, are made by that meanes stronger, and in the middelt of iij. are constituted. And vnlesse this sayd tendon had bene so deuised, the straight muscles in no wise could haue bene placed in the middelt. But these Tendons are vnited together agayne at the white lyne, and here doe end after the same maner, as did the descendentes cleauing to the sinewy partes of the straight Muscles. The office whereto the ascendent and descendent Muscles do serue, is to comprasse and strayne the intrelles, as also by drawyng the ribbes downwarde, to dilate the brest.

The iij. Muscle of Abdomen are these, called the strait Muscles, because they lye after the rectitude, and length wayes of the body, being replenished also with straight Fibres. The sentence of *Galen* as touchyng the straight Fibres is deuyed: in that their beginning (sayth he) is from the brest, which in deede was of latter tyme proued to be from *Os pubis*, hauing y^e beginniges for the most part, the one sinewy, the other fleshy, from the vpper part of *Pubis*: neuerthelesse som tyme they haue but one fleshy beginning. They are ended in Scernon, and in the Cartilages of the last trew ribbes, with a broad endyng, without tendons: yet haue they thre tendinous, and sinewy intersections, whereto the ascendent oblique Muscles cleave. And these diuisions *Galen* in no wise hath marked, although they were made greatly to strength these Muscles, lest that they should be so corpely drawen into Abdomen. To the end y^e belly might be left moze round

D. iij.

they

7.
The ij. first Muscles of Abdomen called the oblique descendentes.

Fuch. lib. 2. cap. 22.
The error of Fuchsius.

Col. Ibidem.
Vesalius reponed by Columbus.

2.
The second ij. Muscles of Abdomen called the oblique ascendentes.

The marvellous arte of nature.

The use of the ascendent and descendent Muscles.

3.
The third Muscles of Abdomen called straight.
Gal. vi. part. Lib. 5.
Lib. 3. de. Anat. ad.
Col. Ibidem.

The use of the intersections of the straight muscles.

The fourth Booke of the

they are in rising very neare together, but the higher they ascende, the further they are separated. Them also beyng sufficient thicke, and strong, nature made to the compression of the Anterior partes of Abdomen: although more evidently they draw the brest downward, to dilate it aboue.

The last are called transuerse or ouerthwarte Muscles, because ouerthwartly in the body they take their places. They come first from the transuerse Processes of the Vertebres of the loynes, although afterward they go forward fleshy, and hauing likewise transuerse Fibres, are coherent to *Os Ilium*, and the lower ribbes. But finally their end is at a broad, sinewy, and Membranous tendon in the white lyne, and cleauyng to *Os Pubis*, as the oblique ascendentes, and descendentes, though not so adherent. So do they cleaue to *Peritoneum*. Their ducty is to compress the belly, and bynd together the Hipogunder.

Furthermore you ought to note that the tendons of the oblique descendentes, and of the transuerse Muscles are perforated. First, at the navel, secondly neare to *Os Pubis*, and through those holes do descend the vessels preparing seede to the testicles, and do ascend the vessels bringing seede called *Deferentia vasa*: which at last are settled into the *Glandules* called *Parastata*. And these be the holes by which the ruptures happen.

Thus the viij. Muscles of Abdomen, besides the comon vse of Muscles which is to swaine the body, are propugnacles, and defences to the subiect partes, and helpe the motions of the brest by their first vse. For if the oblique ascendentes be stretched, in compressing the lower state of the brest, they do streiten the same. But the strait, together which the oblique ascendents, whilst they draw downward the ribbes, they bynd the brest together not a litle.

The ouerthwart, or transuerse Muscles do holwe inward the ribbes, thereby to straighten the brest. Seruyng also to the body most notably, for the expulsion of hard excrementes. But when all of them labour together, the midreife also by retaining of the brest beyng depressed, they so constraîne, and presse the intrels together, as out of a strait place into a larger, whiche is lower, they thrust and expell the bezegges, wholly resistyng their retorne agayne into the Ventricle. And as touchyng generation of boyce, great efflation, restrainte of brest, and propulsion of the byrth in women, nature receiueth by them a large benefite.

But here perhaps some (onely Englishmen) will object, that I leave out the principall properties of these Muscles: in that they retaine such worthy faculties as to attract, retaine, and expulse. In dede I confesse that our meaner sort of Chirurgians, who are not able to dispence with the Latine Authoz, haue learned to many such phantasticall imaginations of sundry Englishe workes, which heretofore haue bene Imprinted, whose authozs whence they drew their labours for the most part, are not comparable to the founders of this building: and albeit their good willes were commendable, yet this much must I needs say, if all of them had sweat more in the workes of Gal. in his administration of Anatomy & vse of partes, their workes had not at this day remained so reprehensible, although Galen we see himselfe, was in Anatomy now and then deceived.

But I much maruaile whence they toke this sonde opinio, that the straight Muscles made the attractive power in the body, the transuerse the retentive facultie, and the oblique an expulsive operation. Which singulare offices, every of these should orderly baire vnto the body, without any other cause of their creation. And namely *Gemini*, after he had thus fallen vpon him selfe, immediatly is about to alledge Galen for his purpose otherwise, who if he had followed in this point, he should haue missed to commit this so great an error. Else Auicen, who in this point is agreable with Galen, as appeareth in his Chapter of the Muscles of the belly. Wherfore I aunswere, that for as much as no worthy writer

The transuerse Muscles of the belly.

The vse of the transuerse Muscles.

The perforations of the Muscles of Abdomen. The vessels preparing seede. The vessels bringing seede. Whence the Rupture happeneth.

Gal. Li. 5. de vs. Part. The vse of the Muscles of Abdomen.

Fuch. Li. 2. cap. 22.

Galen Ibidem.

The vse of the muscles of Abdomen according to our English writers before time.

The authozs of this history commended. Galen sometimes faulter in partes of mans body.

Gemini the principall in this count.

Auic. Lib. 8. Fen. 7. cap. 22.

fer would baire me out therein, except *Mundinus*, whose woordes are generally affected with error: I willingly, by thy patience (gentle reader) do abstaine from such an infamous kynde of description. And if thou desirest somewhat to reason with me, & shouldest say: why is it not likely that the straitte Muscles, lying after the rectitude of the body, should make the power attractive, whereby the concoction made in the stomacke, and put forth into the intrelles, is drawne downward till it be deined by the mesericall veynes of all þ best iuyce, and afterward the refuse gathered to the lower partes, by being still drawne downward, till nature be ready to eiect them: So likewise, the transuerse do retayne, and hold backe, till nature haue done to them her kynde and office of digestion, and that to euery part be geuen his dutie: Agayne, that the oblique haue expulsive propertie, which is to put forth, and expell such thynges as nature commaundeth and prouoketh to be done:

I aunswere vnto thee briedly, that as the Ventricle hath oblique Fibres to retayne, so also transuerse Fibres to expulse the digested matter, which being *Chylus*, thynne, and slowyng sayth *Collumbus*, runneth easely into the spaces and empty partes of the intrels, which is by the transuerse Fibres comprehended as with handes. In the meane time nature is not idle, but lest it should escape by the subtilenes therof, and slippernes of the intrels, beside the office of *Vena Chilia*, fetcheth it in by the notable texture of *Mesenterium*: so that finally all the good iuyce is drawne from the drosse, the ponderous waight wherof cannot stay in the slippery substance of the intrels, though the straight Muscles of the belly had not bene. As touching the retentive facultie, whereby ech thyng should be kept till nature were otherwise willing, aunswere me to what end the oblique Fibres both in the Ventricle and intrelles serue: as also so many turnes, and wyndynges of the intrelles.

How the expulsive facultie is made, I haue already fro Galen, Vesalius, and Fuchsius largely described: or (in a word) it is mightely brought to passe by the contraynte of all the Muscles of Abdomen, *Diaphragma* also depressed.

And this is inough, that the Muscles of Abdomen in falsifying their natures, be not robbed of their due offices. But before I go forthwardes with any other partes, I thought good to say thus much out of *Collumbus*, as touching the inuention of moe Muscles then viij. vnto Abdomen.

There are some Anathomistes of my tyme, who being desirous them selues to inuent some thyng, do constitute x. Muscles to Abdomen, but certainly they are deceiued. For they would haue the fleshy begynnyng of the straight Muscles to be a distinct Muscle, which by no meanes can be: for if they should be Muscles as they say, some office must needes be applyed vnto them. As that they are assistant to the erection of the yard, which they can not do because they cleaue not to it, but are fastned to *Os pubis* aboue. Agayne if the yard were by them to be drawe vpward, so must likewise the Shape of women be: sence in women they are some no other wise then in men: Neither hath *Vulua* voluntary mouyng: they therfore haue inferred, that by them the straight Muscles are ayded, which beareth truth no other wise then the rest. For so strong are the straight Muscles of Abdomen, that they neede no helpe: and in that they will haue their Muscles to compresse the bladder, is all one thyng: for the bladder by all the viij. Muscles is compressed, which onely they would attribute vnto the offices of these.

But there followeth an other no lesse absurditie, in that these fleshy begynnys, which they call distinct Muscles, are not found in all men: therfore belike such persons should wat their vtilities, for which they would haue the sayd Muscles be begotten. Which is a playne ouerthrow of all their vayne inuentions, therfore sayth he in conclusion, it is a vayne saying that they hold of the x. Muscles of

D. iiii.

Abdo-

The cause why I
anchoz waterd
not these offices
to the Muscles
of Abdomen.
Midnas Anatomie
for the most part
ouergrown with
error.
Thus Reader
thou hast bene
taught heretofore
by Gemini.

”
”
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7.
Col. Lib. ii. Cap. 4.
The constitution.

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The Mesicall
Veines of Mesen-
terium.

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” a.

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” 3.

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Col. Lib. 5. Cap. 22.

”
Loco citato.
Collumbus against
the inuention of
mo Muscles the
8. to Abdomen.

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The bladder is
compressed by all
the 8. Muscles of
Abdomen.

”

”

”
The opinion of
the x. Muscles of
Abdomen is re-
proued.

The fourth Booke of the

Abdomen, and may in no wise be defended. But hetherto sufficient.

Col. Lib. 5. Cap. 23.
Of the Muscles
of the testicles.
The Membran
called Dartos.

The Muscles cal-
led Cremasteras or
suspensores.

The vse of these
Muscles.
Gal. Lib. 12. de semine
cicat. per. Fuch. Lib.
2. cap. 30.

Co. Lib. 6. Cap. 24.
The lower Mus-
cles of Penis.
Vesal. Li. 2. cap. 50.

Their vse.
Col. libid.

The other 11. Mus-
cles of Penis.

The vse of the 11.
last Muscles of
Penis

Of the bleedar.

The Glandules
called Parastatas do
conterpne seide.
The muscle com-
plecting the necke
of the bleedar.

The orow which
our cunning cut-
ters for the most
part committe in
taking away the
stone.

Euch. Lib. 2. cap. 31.
Lib. 5. vi. part.
The vse of this
Muscle.

1.
2.
3.

Galen libid.

In following to speake of the testicles, and yard. Every of the testicles rotat-
ing one Pulse, long, and slender, situated in the Membran called in Greeke
Dartos. Their beginning is about Os pubis, where the hole is apparant through
whiche the Seminarie vessels descend, entwapped with the same Membran, yet
do they scant imitate the true forme of Pulses, but are certaine straght fle-
shy Fibres put in the same Membran Dartos. The auncient writers have cal-
led these Muscles Cremasteras, as it were Suspensores or hangers by: made as it
seemeth, that the testicles should hang by them, and not sodainly slippe downe.

By the helpe of these Pulses the testicles of man are by litle and litle obscur-
ly drawne by, least by ouer slacke or lose hangyng downe, the Seminarie vessels
should be overloaded. But the foresayd vse of these Pulses are most notable pro-
ued in the Acte of generation. For if alway the testicles should draw downe, and
load the Seminarie vessels to the perpetuall coarctatiō of their passages, they could
not so properly ejaculate the matter of generation, as when the waight beyng sub-
leuated by the attractiō of these Muscles, their passage is made more easie & open.

The yard beside his substance, and y thick Membran which entwappeth it,
hath foure Pulses. Of which the ij. first haue their beginninges from the
orbicular, or round compassed Muscle, which lyeth at the extreme end of Rect. inte-
stinum. they are neare one to another, & with their inner sides ioyne mutually
together, beyng planted to the binary passage: whereas beyng in them selues
denided, do as it were embrace the body of Penis like fingers. And beyng thinne,
are made to this vse, that whe seide or vrine should be put fourth, they then might
open the way.

The other ij. Pulses rise from the appendaunce of the huckle bone under the
rising of Penis, which taketh his beginning from the inferiour part of Os pubis.
These Pulses are short, but thicker then the aforesayd, and end in the body of
Penis. Whiche as they are also ayding to the course of Vrine, so much more they
profit in the tyme of coiture, sustaynyng, and holdyng the yard erected, untill the
whole act be finished.

At the end or necke of the bleedar, in man groweth two Glandules or ker-
nells called Parastatas: which are alway, except in children, old men, & such
as be consumed by leaneesse, full of seide. In the end of these Glandules is put a
thinne, round, compassing Muscle with circular Fibres, which serueth to bynd
together the necke of the bleedar, lest the Urine at any tyme agaynst our willes
should issue forth. For were not this Muscle, the Urine every houre would an-
noy vs, as it chaunceth to them, in whom the same is relaxed: as also to such,
in whom the same by wicked Emperickes professyng to take away the stone, is
cut ouerthwart, who, of the situation hereof beyng altogether ignorant, do in
steade of takyng one grief away, induce manifestly an other disease, whiche is
most filthy and lothsome.

Leonardus Fuchsius maketh this Muscle seruiceable to three notable uses, the
last wherof he taketh from Galen. One is to shut the Orifice, & necke of the blad-
dar. The second to leane nothyng in the binary way: for when the Urine is gone
forth immediatly this Muscle plucketh together, and driueth out the rest of the
Urine that remaineth in the way: as commonly there are ij. or iiij. dropes that
go forth after the stowpyng of y Urine. The third, which Galen witnesseth to, is
for the promptitude and swiftnes of excretion or makyng water, yet not of that
whiche is in the bleedar but that which is already in the binary passage: nei-
ther so swiftly (as now) the bytyng Urine could passe through the binary way,
had not Nature placed round about the exterior part of the same passage this
Muscle: so notably seruyng to his vse.

The

The extreme end of the straight intrell is called the Fundament, embued with his proper vles with iij. Muscles, one, whiche prohibiteth ech vntymely and inuoluntary egestion of excrementes, and other ij. which speedely plucke by the end of the straight intrell, thrust forth befoze by egestion.

One of them therfoze is round, compassing about the end of the straight intrell called *Sphincter*, and being broad and thinne, containing ouerthwarte Fibres, is much vnited together with the skinne and Ligamentes receiued from the saile bone, and this is comparable to that of the bladder, whiche preventeth vntymely excretion. The other ij. are also broad and thinne, beginning from the Ligaments of *Os sacrum*, and from *Ilium*, and ending in the vpper part of *Sphincter*. These in like sort are ordained of nature to draw by agayne the straight intrell, lest it should go out in such as straighe them selues, as neuerthelesse in some sometyne no doubt it fortuneth.

Dancers and sundry, great, and necessary motions are appertaining to the thighe as to extend, to bowe, to moue toward the other legge, agayne outward on the side, & to turne about with a compassing motion. The thigh therfoze (saith Galen) is bowed towardes the flankes in lifting the same vpperward, & extended in setting the same directly to go on the earth. But the chiefest extensio therof is whilest we stand, to the whiche action nature hath geuen many, and strong Muscles. But the nuber of the Muscles seruing to the actions of the thighe is r. great, & strong, as it was behofull to the mouyng of a member so thicke and long.

Of these the first is that Muscle that doth constitute the hainches, sufficient thicke, and fleshy: springyng from halfe the Appendaunce of *Os Ilium*, from *Os sacrum*, and *Cocix*, it hath a broad and halfe circled begynnyng. Neuerthelesse becommyng alway narrower and narrower, it ceaseth at length at a sharpe end, which is committed to the greater Trochater, and going lower in the thigh, lyeth vpon the ioynt of the hippe with a broad tendon.

The greater part of the second Muscle lyeth vnder the first, being somewhat blacke: it springeth from the whole Appendaunce of *Ilium* with a fleshy, & halfe circled begynnyng, it runneth vpon the same ioynt also, and endeth at a broad and strong tendon, which cleaueth to the toppe of the great Trochater or Proccesse of the thighe, and embraceth it.

The thyrde Muscle of the thighe lurketh vnder the second whole, being also blacke, and begynnyng fleshy, and in circle wise. It goeth from *Os Ilium*, and as is sayd of other two in his progresse it diminisheth, ceasing at a tendon, which to the sayd great Proccesse is knit, and that in the inner point thereof, where it is somewhat innerted.

These iij. Muscles haue the office to extend & stretch out the thigh, to attract, and draw it vpperwardes, as also to lead it to the exterior partes.

The fourth hath an oblique situation, and springeth from the iij. lower bones of *Os sacrum* with a fleshy (as it seemeth) and round begynnyng. The end of it is at a round tendon, which in the toppe of the greater Proccesse toward the posterior partes endeth, and drawing the thigh to him selfe, hath also power to helpe the circumaction therof.

The fift Muscle is of the loynes sited in Abdomen, being round, fleshy, thicke and strong, sited somewhat oblique, and all blacke: his begynnyng is taken from the xi. and xij. Vertebre of the backe, and the iij. vppermost of the loynes, where the body of the Vertebres is: it descendeth vpon *Os pubis*, and ending at a round tendon, is to the lesser Trochanter innerted.

The vi. Muscle occupieth all the whole inner hollow part of *Os Ilium*. It begynneth from the whole Appendaunce therof, being placed in Abdomen with a semicircular rising: it descendeth aboue *Os pubis*, and is fleshy almost to the extreme

K.i.

end

Vul. Lib. 1. cap. 51.
The Muscles of
the straight gutte.

Col. Lib. 5. Cap. 27.
The round compassing Muscle of the straight gutte called Sphincter.
The ij. other muscles of the straight gutte and their vles.

The Muscles of the thigh.

The mouynges of the thigh.

Col. Lib. 5. Cap. 28.
The Muscles mouyng the thigh are ten.

1.
The first Muscle mouyng the thigh doth constitute the buttocks.

The vles of these iij. Muscles.

The fourth Booke of the

The use of the fist
and 7.

end thereof, where it degenerateth into a tendon, which to the lesser Trochanter is implanted. And the use both of the fist & this, now described, is to bolue the thigh.

Lib. 5. Cap. 59.

The seventh goeth out from *Ospubis*, neare vnto the Cartilage thereof with a broad beggynnyng, and oblique situation, but endeth on the inside of the thigh, vnder the lesser Trochanter with a slender tendon. And this nature made to draw one thigh toward an other, and to put one thigh vpon an other. And thus sayth *Cal.* although in doct. *Vesalius* contrariwise sayth it serueth to bolue the thigh.

8.

There is no muscle in the body greater then the viij. (This *Galen* and *Vesalius* describ in the fist place) filled with such varietie of Fibres, as if a man coucted to decrease, and not to teach, he might easily for this shew you iij. or iij. muscles. It springeth from the bone *Pubis* that is, from the inner part thereof. And from *Coxendix*, amplexeth the lesser Trochanter and tendeth downwardes cleauing in that long and rough lyne, and in the hinder partes is fleshy. But at length begetteth a Tendon which to the head of the thighe on the inside is inserted. The use of which Muscle is to erect the thigh: so doth it ayde the senenth also, when we intend to put one thigh vpon, or a lost an other.

9.

The ninth Muscle occupieth all that hole contained in *Ospubis*, and *Coxendix*, and that in the exterior part. His beggynnyng is broad and fleshy, it goeth forth toward the exterior part, lyeth ouerthwartly, and alway betcommeth narrower: so that at length it stretcheth forth into a strong tendon to be fastened in a certaine cavitie, in the great Trochanter appaunt.

10.

The marvellous
creation of this
tenth Muscle.

The tenth and last Muscle of the thigh is in the interior part, and the aforesaid hole it likewise occupieth. This Muscle (sayth *Collumbus*) is not onely not to be neglected, but chiefly, and most especially to be marked, for it is marvellous therein to contemplate the great providence of the high creator. For the beggynnyng thereof is broad and fleshy, as afoze is sayd of the ix. Muscle, and from within, it is caried without aboue *Coxendix*, where a cavitie is made that representeth the forme of a polley. This Muscle where it boweth to it self in going forth maketh oft tymes iij. tendons, sometyne four, and sue, which are at last vnted together, constituting one only notable tendon, whose end in the posterioir part of the greater Trochanter is finished. But ere I end, where this Muscle beginneth first to tast of tendinous substance, there immediatly nature by great industry hath prepared a fleshy purse or bagge, wherein this tendon is safely placed from any hurt by the same bone, which as by this muscle comprehended, neither is the same fleshy bagge being so good a propugnacle, any way to be accounted as a differing muscle from the other.

Cal. vi. part. lib. iij.
How ambulation
is made.

Ambulation (sayth *Galen*) in man, is made by the one legge fastened one the earth, and the other taken from the same, and circūlated. But to fasten and set downe on the earth is the action of the foote, and to circūlulate, or fetch about is the action of the whole legge. This is not onely in going, but also in running: the one foote continually being set on the ground & the other together with the whole legge caried forward. But to chaunge the places of setting happeneth by the benefite of the legge: albeit that the stay of our falling, and firme setting on the ground, is brought to passe by the good composition of the foote.

Vesal. Epist. Cap. 2.

Vesalius describeth the legge as though it were onely to be erected, and bowed, without any other manner of motiō, and therefore not notably accounteth aboue the number of ix. muscles.

The legge.

But the legge (sayth *Roaldus Collumbus*) extendeth, and boweth, as is openly seene, according to the rectitude, or straight measure thereof, and is obliquely also towardes the exterior partes moved: although the same motion be obscure, which oblique motion *Vesalius* confesseth not. These same motions neuerthelesse are wrought aptly by x. muscles, wherof v. do bolue, foure extend, and one onely in the

Coll. lib. 5. Cap. 29.

the hamme which geueth oblique mouing. And this one *Vesalius* imagined if it do any thing, that it doth imitate the motion of the first muscle that moueth *Radius* directly downeward. For it being sited obliquely could not haue or make any straight motion: and because he had deneged oblique mouing to the legge I omit to say he would not acknowledge the right office of it. But surely he hath left the vse therof to be of other moze aptly described, as appeareth by that is sayd. Wherfore so much the rather I giue credite vnto *Columbus*, and to his assertion as touching this oblique motion.

The motions of
the legge are made
by ten muscles.

The first of these Muscles riseth both sinewy, & also fleshy frō the inner part of the Appendage of *Os Iliū*, but forthwith goeth forward fleshy, broad, & thinne like a swable band, & slopwise is belated by the interior partes of the thigh, but whe it cometh to the inner head of the thigh, it proceedeth, & at a sinewy tendon is ended, which is not round (sayth *Columbus*) as *Vesalius* would, but broader, & fastened in the fore part of the legge. He also reprehendeth Galen (vnles his meanyng was onely of Apes) in that he affirmeth, by the benefite of this muscle that one legge is layd vpon an other, as children haue occasion to do in playing.

But to go forward, the second muscle of the legge springeth from the anterior part neare the Cartilage of *Os pubis*, the beginning therof being broad, after the length of *Os pubis* commisure: it descendeth fleshy, with straight Fibres, at the interior head of the thigh made round, and ceaseth at a sinewy tendon, also almost round: notwithstanding it is furthermoze dilated, and at length ended in the fore part of the legge.

The third with a sinewy beginning long, and also round, springeth from the lower part of the Appendage of *Coxendix*, being made fleshy afterwarde about the middest of the thigh, and is caried downe by the hinder part of the thigh, with many sortes of Fibres: but connyng to the knee, it maketh a sinewy tendon, wherewith it is implanted to the posterior but interior part of the legge.

The fourth from the same place beginneth neare vnto the third, but the beginning is both fleshy, and sinewy, and descendeth downward by the posterior partes of the thigh with straight Fibres. Neare vnto the knee it goeth out in a sinewy tendon, which before the end is dilated, and ceaseth at length in the anterior part of the legge betwene the first and second.

The beginning of the fift is from the Appendage of *Coxendix* neare vnto the third and fourth, sharpe at first, then after thicker, and marcheth forward by the posterior but exterior part of the thigh. But where it hath wonne the middest of the thigh (a thing worthy to behold and note) it obtaineth a heape of flesh, springyng from the middest of the thigh, whiche least any body should imagine to be another Muscle, *Columbus* assureth vs it is not separable from this fift Muscle neither to be accompted one distinct Muscle from it. Neuerthelesse if any man will call the same fleshy part of the fift Muscle an other new Muscle. He supposeth it sufficient to haue admonished vs of his iudgment. In the same place it beginneth outwardly to degenerate into a tendon, which together with the afore sayd flesh descendeth euen to the end, and in the end is collocatē in the head of *Fibula*. If the cause be inquired why nature added to this Muscle this portion of flesh, *Columbus* sayth, that to the end this Muscle might be made the stronger, Nature would that it should come from the middest of the thigh to be the nearer vnto it: for on the outside is onely this Muscle, but in the inside be foure. And the office of these fine Muscles rehearsed is to holue the legge. Although that which *Columbus* hath orderly described in the fift place, Galen and *Vesalius* haue cited for the fourth.

The use of these
first muscles of
the legge.

Col. Ibidem.
An vntoworthy say-
ing of Galen.

This is that Muscle that Galen sayth he commaunded to be cut in a certaine currou, who neuerthelesse could runne moze swiftly: which thing is most vn-

The fourth Booke of the

worthy, for such a prince of Physicke to imagine, or say. For this muscle being taken away: direct flexion can in no wise be brought to passe: which straight flexion of the legge, to be in running Galen admonisheth vs in *Lib. secund. de Anat. administrat.* And truly this case standeth cleane contrary: for such as be wounded or cut into this muscle, although the wound be not very great, yet when they are healed, it shalbe a labour vnto them to bowe the same legge. Thus much of the Muscles bowyng the legge.

Now, to the extensors thereof there be iij. in number seruicable. The vi. muscle therfore of the legge springeth from the middelt of the Appendaunce of *Os Ilium* both fleshy, & also sinewy in the begynnyng. It is a short muscle, but thicke, and is ioyned to the greater Trochanter, there his flesh endeth: but then foloweth a broad, sinewy, and membranous tendon, then which there is no greater in the whole body: it comprehendeth almost all the muscles which are placed about the thigh, and hath straight Fibres. This tendon truly is of great nobilitie, much therfore to be marked of Chirurgians, least at any tyme trasuersely they deuide it. It completeth the rotule of the knee, and to the Anterior part of the legge, and *Fibula* is at length inserted.

The seuenth hath a sinewy begynnyng from the greater Trochanter: and wholly compassing it: it cleaueth to the thigh aboue, and outwardsly very thicke is this muscle, and all blacke, goyng forward fleshy with straight Fibres to the rotule of the knee, and furthermore endeth at a broad, and membranous tendon, which completeth the same.

The viij. riseth sinewy from the necke of the thigh, and from the greater Trochanter as it were haupng y. begynnynge, but is immediatly made fleshy, and cleaueth to the thigh. The progresse thereof is in the Anterior part inwardsly marchyng downe to the rotule, with sundry sortes of Fibres: and the end thereof is a tendon, which also completeth the knee.

The ix. issueth from the anterior part of *Os Iliu* aboue the ioynt of the hippe, sinewy and sharpe is the egression of this muscle at the first, but afterward fleshy, and round. The figure of it is as appertayneth to a muscle. It goeth straight vpon the forepart of the thigh betwene the seuenth and viij. muscle. But before it come to the knee, it engendeth a strong sinewy tendon, which setteth a narrow betwixt meth broader, and ioyneth together with the tendons of the seuenth & viij. muscles, which together embrace the rotule of the knee, though their endes be inserted to the anterior part of the legge. These foure muscles last described do extend, & stretch directly forth the legge, euen as by the other v. it was directly bowed.

The x. muscle lyeng vnder the hamme, cometh out with a sinewy and round begynnyng from the outer head of the thigh, but afterward puttyng on a fleshy nature, and situated obliquely, with oblique Fibres, implanted fleshy to the posterior and interior part of the legge. Therfore this muscle obliquely serueth to moue the legge towarde the exterior partes sayth *Collumbus*: denyng what soeuer *Vesalius* hath sayd to the contrary.

The foote it behoued not to be round and hard (sayth he, that wrote the vse of partes) but long, broad, soft, and oft deuided, because such lyke constriction is moete for all difficulties of places: as clymmyng of trees, wales, rockes or such lyke. And I haue knowne (sayth he) whose toes haue bene mortified with snow, and cut of, and yet these in standyng, walkyng, nor runnyng, would giue place to sound persons, vnable (not withstandyng) to go downe, any hollow, or steepe place. And such as had the next part called the plant corrupted, might not go in plaine places: but *Tarsus* so spoiled, neither could they stand, much lesse go at all.

The construcion of the whole foote is therfore most proper and necessary to nature, so that it can both bowe, extend, and moue to the sides, by the helpe of his mus.

The tendon of the vi. muscle of the legge the greatest of all tendons.

The Muscles extending the legge.

Gal. vi. part. Lib. 8.
The foote and of the necessary figure thereof.
The defecte in such as want the toes.
The want of the plant.
The lacke of *Tarsus*.
Col. Lib. 5. cap. 10.
The Muscles of the foote.

muscles. Which are deuided into *Posteriores*, and *Anteriores*. Being in number xij. or at the most xiii. albeit I know *Vesalius* there reckneth but nine.

The first springeth frō the inner head of the thigh, aboue the knee backwardes, and begynneth fleshy and narrow. But in goyng forward is dilated, and about the middest of the legge endeth at a broad and sinewy tendon, which allway after is made narrow, and ceaseth at the superiour, and posterior part of the heele.

The second is like vnto the first. For although it go out of the outer head of the thigh, yet in all the other space it doth the like that is reported of the first, so that it seemeth to be onely one muscle with two begynnings. And albeit *Vesalius* hath these wordes, when as both these sayd muscles stretchyng from the head of the thigh downward, not farre from their begynnynge do mate together, and cleaue with Fibrous knittings, & the lower they descende, the stronger they grow together, so that now the tendon which either of them produced is altogether as one, spring from both the muscles: the interior or first muscle (notwithstanding) is somewhat longer fleshy caried downward, then the second: yet *Collambus* (with out any such wordes) sayth, that in verie it is one body and one tendon. And further, if it were not that he endeuoreth to shun by all meanes, what soeuer might make the mynde of the Reader perplexed, he would not sayle to affirme these ij. muscles (as they describe them) to be one, and onely a muscle, with a double begynnynge as is already sayd.

But in the meane tyme these two, whiche may so worthely be called one, do make the posterior bellye of the legge called *Sura*, and by our vsuall phrase, the calfe of the legge.

The third is a small muscle, rising frō the outer head of the thigh neare to the ioynte. The goyng forth of it is sharpe in the begynnynge, after it stretcheth forth with a bellye, and is short: but endeth at a round sinewy tendon, then which, among the round Tendons in the body, is not a longer to be found. This muscle lyeth vnder these two aforesayd, is obliquely placed, and containeth oblique Fibres. It marcheth from the outer partes towardes the inner, cleauyng to the tendon of the two aforesayd, being yet at last implanted to the inside of the heele, and hauyng in office to euerte the foote to the interior partes.

The iiij. is the greater muscle of the legge, and blacke, and springeth from the posterior part vnder the Appendance of *Fibula*, with a strong, & sinewy begynnynge, but after goeth forth fleshy, and cleaueth to both the bones of the legge, exceeding them in breadth: but where it is come vnto the middest of the legge, it stretcheth forth narrow, and maketh out a tendon towardes the heele, then which, through out ma, none is more strong: and this tendon being vnited together with the tendon of the first muscles, is ended in the posterior part of the heele.

The office of the first, ij. and iiij. muscles is to extend the foote, and set it to the earth, to the which thyng yet other foure muscles do minister helpe plentifully.

When Hector should be drayned (as it was sayd) after that violent fashon, as the Historie mentioneth, he was bound by this tendon, & dayly we see how that bondchers do bagg by whole beastes thereby: which sufficiently declareth the force thereof.

The fifth muscle commeth from the two Bones of the legge *Tibia*, and *Fibula*, and cleaueth to the Ligament that is put betwene them to deuide the Anterior, from the posterior muscles. It is fleshy almost to the end of the legge, and neare to the inner ancle: it endeth at a strong, sinewy, and round tendon: and goyng vnder the inner ancle, as also vnder the botelike bone, at length endeth vnder the sole of the foote in the part that is called *Tarsus*. Nature begate this muscle to this vse, to draw the foote inwardly: nether is it without a Ligament.

The vij. muscle floweth from the posterior part, with a long, and fleshy begynnynge, although that afterward it doth degenerate into a round tendon, and

Vesal. Li. 2. cap. 50.

The first muscle of the foote.

Lib. 2. Cap. 59.

Lib. 5. Cap. 30.
Collambus affirmeth the first and the second both one.

What maketh the calfe of the legge.

The longest tendon in the body.

The tendon of the fourth muscle of the legge: & strongest of all others.

The muscles extending the foote.

The tendon where by Hector was drayned about the wallis of Troye.

The fourth Booke of the

The perforated
tendons of the
foote.
The tendons that
bow & foure toes
of the foote.

7.

The first Muscle
in the fore part of
the foote.

The tendon in
the foote that ap-
peareth so neare
under the skinn
The tendon bow-
ing the extreme
foote.

2.

The tendons ex-
tending the foure
toes.

3.

Lib. Cap. I. bid.
The Muscles
which is accomp-
ted the 13.

4.

5.

How the foote
may be set to the
grounde.
Col. Lib. 5. 31.

goeth vnder the inner angle, beyng endued vnder the heele with a Ligament, spring from the Appendaunce of *Tibia*. The sayd Tendon is deuided vnder the sole of the foote into foure round perforated Tendons: whiche procede forward vnto the thyrde ioynte of the foure Toes (the great one excepted) and are there inserted for no small vtilitie: for they bow the iiii. toes, and strongly bynd them.

The vij. begynneth long, and fleshy fro *Fibula* the space of thre fingers vnder the Appendaunce: it is fleshy, vntill it come vnto the heele, where it is chaiged into a round tendon, which from vnder the Ligament vnder the angle slippeth vnder the sole of the foote, and is inserted to the bone of the great toe, to bowe it. Whertherto of the posterioir Muscles of the foote: now to the Anterior.

The first of these riseth from *Tibia*, that is from the Appendaunce neare vnto *Fibula*, cleauyng much thereto, and beyng sufficient thicke, is also greater then the rest of the anterior Muscles. This, where it is gone beyond the halfe length of the legge, becommeth narrow, and endeth at a round, sinewy, and strong tendon, whose progresse is by the vpper part of *Tarsus*: it is detayned by a Ligament which issueth out from the inferioir Appendaunce of *Tibia*, and *Fibula*. This is the Tendon, which is so lifted vp, and euident to be sene vnder the skinn. It endeth at the part of the foote called the Plante, in the Bone that is put before the great toe: and hath the power to bowe the foote.

The second goeth forth with a sharpe begynnynge from the Appendaunce of *Tibia*, and cleaueth to the Ligament that lyeth (as is sayd) betwene *Tibia* and *Fibula*. Whereouer at the end almost of this same *Fibula*, the roote of this Muscle is fleshy: notwithstanding it endeth in foure round Tendons, which are detayned vnder that Ligament, that riseth out from the Appendaunce of *Tibia*, and *Fibula*. These foure Tendons are enlarged, and at last inserted to the vpper part in all the toes of the foote, the great one excepted. So that they can extend, and stretch forth these toes.

The thyrde springeth fleshy from the middelt of *Fibula*, neare vnto the Ligament: then after degenerateth into a round tendon, which is also vnder the overthwart Ligament, caried and inserted to the last ioynt of the great toe, which it both extend. This tendon is into y. deuided, whereof the one endeth as aforesayd, the other is inserted in the same bone of the plant, yeldyng helpe to the bowyng of the foote. This second tendon springeth also from the muscle: which position in some seldome bodies seemeth to be an other Muscle, as some perhappes will suppose. But *Collumbus* affirmeth it to be but onely one. Neuerthelesse he forceth not greatly, if any man thinke good to number and accompt it two Muscles. But then to the xij. (as before is named) must be added a 13. and so the number of the muscles seruing to the extreme foote, is xij.

The fourth springeth from the vpper Appendaunce of *Fibula* towardes the exterior partes: it consisteth in the begynnynge both of fleshy, & sinewy substance, but is made fleshy afterward: lastly it putteth out a round tendon, and vnder the sole of the foote his endes are comitted to the bones of the plant. This Muscle turneth the foote to the exterior partes & consisteth vnder the transuerse Ligament.

The fift likewise byusteth forth of *Fibula*, with a long begynnynge, outward it is fleshy, euen as is sayd before of the fourth, and it marcheth on vnder the outer angle, where together with the fourth it finisheth at a round tendon: and is inserted to the bone of the plant, that is put before the litle toe. So by meanes of this Muscle, the foote is drawne to the exterior partes.

But finally this is to be noted, albeit we haue sayd that the foote by all these Muscles either is extended, or bowed, els drawne outward, or inward: neuerthelesse it is certaine, that all agrepyng and in one action together concurrant, then the same, by all these together, is fixed on the ground.

Mus.

Muscles serving to the toes, & placed in the extreme parts, are the first in number. Although we have above described other six, which extend to the toes, & others extend, as we have administered. So it is to be ingested, by which means it cometh to passe, that the Muscles serving to the toes of the foot, be the seventh.

The first therefore of these six, proposed, is the first under the middle of the plante, beginning from the inferior part of the hile, that is from the Appendage. To this is added a broad tendon, which Galen esteemed to be the beginning of the third Muscle, which we have accounted the six, among the posterior Muscles of the legge, Galen the fourth. The beginning of this Muscle is both fleshy and fleshy, under the plante it is divided, and goeth forth in six round perforated tendons, which are sutured to the second ioyntes of the six toes, as they are named to be perfect, but more marvellous to be done. Their office is to bow the second ioyntes of those toes. The broad tendon which is added unto this Muscle, is most sharpe of taste, so endued of nature to discerneth outward inward fleshy.

The second Muscle is produced also from the hile, neare to the first, but is in the inner side almost round, and is tied to that bone of the plant, which before the greater toe is perfected, so it purchaseth a Tendon, which to the great Toe is implanted. And this was made to be end, that by it the great Toe from the other Toes, might be moved.

Also the third Muscle springeth from the hile, neare unto the first: The length thereof is toward the Anterior part, and is sutured to the bone of the plant that is put before to the little Toe, where the Process thereof is to be done: and at length maketh out a tendinous substance to the same little toe, to lead him from the rest.

In departing from these three, other four do follow, as are situated under the sole of the foot, and bones of the plante, whose beginning is both out from the tendons of the perforating Muscle, which ceaseth in the third ioynte of the four fingers, but these Muscles being of them selves small, and round, do mutually from the hile receive a portion of flesh unto them.

Of these Muscles Galen and Vesalius do write, & that their office is to plucke away the six toes from the thole, as great toe, because they are in the six round, and fleshy tendons, which goe forward to the outer part of the four toes, and are bound to the superior tendon, which we have said to have power to extend. But they march forward unto the extreme toes, neither end they in the first ioynte as Vesalius would: but in this point was small diligent, when he granted to these Muscles but onely oblique motion. But know gentle Readers this to be my invention (sayth Columbus) neither is this bid of them knowne to any man that ever writ before us in Anatomie: for these Muscles move not with an oblique motion, but do truly extend, and stretch out the four Toes: and so truly they extend, as that by them they are more extended, than by the other tendons: as the eyes being judges, it is easie to be perceived by any expert observation.

Beside these, there be 1. Muscles in the bones of the plante. For to every toe 4. Muscles are added, which are stretched from the beginning of the hile, and end in the first ioynte of all the five toes. They are fleshy, therefore fleshy of nature, to obey to bending more readily: which thing is brought to passe when two of them move at one time: But other wise, when onely one of them moveth, then doe they draw the toes obliquely inward, and outward.

The last Muscle that is placed in the extreme parts, that is the sixth, is situated upon Tarsus, and Pedium, beginning from the Ligament, that imbroth together the legge and Fibula with the foot: It is a broad and thicke Muscle, ending in 4. tendons, and some tyme in six. So is it at length inserted in the extreme part of all the toes, and in moving, those toes thereby are obliquely extended.

The tendons serving to the toes are 12.

How 3. Muscles serving to the toes are 11.

The 1st Muscle to the toes.

The 2nd Muscle.

The four perforated tendons and their uses.

The broad tendon of the foot of most exquisite sense.

1.

3.

The tendon leading the little toe from the rest.

4.

The perforating Muscle.

5.

Vesalius and Col. differ in the moving of these six Muscles.

Col. Lib. 5. Cap. 31. The use of 3. Muscles extending the four toes according to Col. to move other knowne.

The 1st Muscle serving to the extension of the toes.

12.

The 1st Muscle serving to the extension of the toes.

13.

The 1st Muscle serving to the extension of the toes.

14.

The 1st Muscle serving to the extension of the toes.

15.

The 1st Muscle serving to the extension of the toes.

16.

The fourth Booke of the

The Muscles les-
sing to the cubite.

Two Muscles
extend the cubite
and the bone.

The first Muscle
bowing the cubite.

The cubit is both bowed, and also extended straight without any manner of oblique motion. Which thing surely every man may easily practise in him selfe. But these not being able to be brought to passe without the organs of voluntary moving, let vs see what store of the are attributed to each manner of his actio:

Two Muscles there be therefore for flexion, & as many for extension: although Galen maketh iij. to extension, which is manifest (sayth *Vesulius*) in Apes.

Of these, the first is a strong Muscle, evident vnder the skime, and sited in the interior part of the shoulder: it springeth from the shoulder blade with ij. distinct beginninges: wherof the one is sinewy and round, beginning from the upper part of the brow of the scapula, or acetabulum made in the scapula bone, it goeth further about the head of the shoulder, & clippeth through that chinke that is sited in the same superiour part, which chinke in deede nature created of purpose for this tendons sake. The other beginning of this Muscle, goeth out from the Procelle called *Ancyroides*, partly sinewy, & partly also fleshy: but the fleshy part cleaueth to the shoulder, and seemeth a distinct muscle, & separated, which yeldeth helpe vnto the shoulder, since thereby he is drawing towards the breast. Furthermore these ij. beginninges of the sayd Muscle are vnited vnder the head of the shoulder together, makinge a thicke Muscle and almost round, strong, and filled with straight Fibres, which in the elbowe leaueth at a sinewy Tendon, which neare to the end is dilated, and knit to *Radius*, who hath in the inside thereof a Tubercle, made properly for the insertion of this Muscle.

The ij. Muscle from the bone of the shoulder is called all fleshy, with straight Fibres, and lyeth hid vnder the first Muscle. It is carried fleshy beyond the iopite of the cubite, and lastly fastened to *Cubitus*, and *Radius*. And the cubite by the vntitie of these two Muscles, is made directly to bow.

The third is produced from the shoulder blade a litle vnder the necke thereof & is carried by the hinder partes of the shoulder: it is together with a broad tendon, & being fleshy, stretcheth his tendon to the posterior Procelle of *Vna* called the elbowe: and also goeth beyond the same. And straight be the Fibres of this Muscle.

The fourth hath two beginninges from the necke of the shoulder, whereto it cleaueth much, and is so ioyned together with the third, as that the third and fourth seemeth one onely Muscle, with many beginninges: albeit in deede they are ij. finally this fourth Muscle endeth where the third, hauing also straight Fibres. And the office both of the third, and fourth Muscle is to extend, and stretch forth the cubite straight.

The hand.

Why last of all he
speaketh of the
hand.

Lib. 5. Cap. 33.
Of the Muscles
of the hand.

What Muscles
will abide longest
in dissection.

The Muscles of
the hand are deu-
ided into inner
and outer Mus-
cles.

The inner Mus-
cles of the hand
are best.

The first of the
Muscles of the
hand.

As touching the hand so notably of the omnipotent creator created, as that it is most apt, and prompt to all, and euery kynde of Art, defence, and safe prouision for the body, so as no member more declareth the unspeakable power of almighty God in the creating of man: because I will neither vse a double labor, nor yet detain thee withayne circumstance from the summe of the matter, I comit thee to the History of Bones; where out of Galen compendiously we haue noted the noble vse and effourmation of this member.

Here the hand is spoken of last of all after the same order, and accordingly as *Collumbus* useth, because the end of a tale is the better carried away. And this member is most notable, and worthy longest to be boine in mynde. The Muscles wherof (sayth he) will, in dissection, the longest endure vncorrupted, both because, whilest we liue, they are more exercised, as also for that they are clogged with lesse fat. These, in describing, are (after the manner of Galen) to be deuided into outer, & inner Muscles, as those that moue the foote, before, are sayd to be deuided.

But to speake first of the interior Muscles, they be in number viij.

The first wherof is very proper: it springeth from the toppe of the inner Tubercle which is in the shoulder, with a sharpe and sinewy beginning, and forthwith goeth

goeth small & fleshy, but beareth the true forme of a Muscle: for the head therof is small, the belly broad, and the tayle long, & strete, even downe to the wiest. This Muscle moreover goeth somewhat obliquely toward the hand, and endeth at a round, and long tendon, which runneth aboue the inner Ligament of the wiest, which beyng passed, of the remnaunt is made a broad tendon, which is extended through the hollow of the hand: but leaupng the ij. greater hilles discovered, is at last among the iij. fingers bestowed. The true vse of this Muscle, is to helpe the fingers in bowyng, and being exquisite of sense, what soeuer we therfore comprehend, or gripe in the hand that offereth vs any present hurt, (for in a moment we know it, by the sensibilitie therof) we cast away, and immediatly auoyde it from vs, before it procede further to hurt vs. Neither is it made to that end, as that the ball of the hand therfore should be without heare, as some would imagine; for *Columbus* writeth of certaine theues which had not this Muscle, but onely a tendon brought from the inner Ligament of the wiest.

The second goeth forth from the inner tubercle of the shoulder, tēdyng sharpe in the first begynnynge, both sinewy, and fleshy, it cleaueth fast to the cubite, and marcheth after the length of it vnto the rote of the wiest: and is vnto the cubite as a soft bed, or bowster: but first at the commynge therof to the wiest, it degenerateth into a Tendon, and both with a fleshy, and sinewy end is implanted to the fourth bone of the wiest of the hand.

The third Muscle begynneth at the same place, with an oblique progresse after the length of *Radius*: yet in commynge likewise to the wiest, it goeth out into a round, and strong Tendon, which is inserted to that of the Postbrachiall bones that supporteth the litle finger. The office of these two Muscles is, that, if both moue at once, they bowe the wiest, but when one alone styreth, then doth it moue obliquely, now vp, now downe, by the helpe notwithstanding of two exterior Muscles, as we shall come vnto anone.

The fourth hath a marueilous beginning. For it springeth sharpe and sinewy from the inner Tubercle of the shoulder, so that it becometh afterward fleshy: & is caried longwise after *Cubitus*, & *Radius*. After, when it hath passed the middell of the cubit, it stretcheth out narrow, & is ended in iij. round tendons, sinewy, & perforated, which are brought vnder the Ligament of the wiest, vnder which neuertheles the iij. first Muscles are not caried. The end of these tendons is in the second ioynt of the iij. fingers, which they serue to bow: & because they were to be penetrated by the tendons of the v. Muscle, goyng to the ij. ioynt of the foure fingers as shalbe sayd, therfore nature perforated these: which be sinewy, saye, & shynning: a thing notable and marueilous to behold. This prudent nature also wrought, to the end that the fingers after a certaine order should follow one another.

The fift Muscle is much stronger then the fourth, and no meruaile: for that it behoued it to moue after, & with greater force, since it boweth the foure fingers, excellently constrainyng them together. It springeth neare the fourth, but (for the most part) fro the vpper and interior part of the cubit. It lyeth vnder the fourth Muscle, and straitnyng by litle, and litle, cleaueth to the cubit, before it come vnto the wiest: at last it goeth forth in iij. round, sinewy, and perforating tendons, whiche finally are inserted to the third ioynt of the foure fingers, the thombe in dede being exempted, contrary to *Galens* mynde, who would haue the v. fingers bowed by this Muscle, and that one of the tendons therof should extend vnto the thombe: which to be true in *Apes*, *Columbus* playne affirmeth. For the thombe in man is moued by his proper Muscle, as shalbe sayd. This fift (moreouer) cleaueth to the Ligament which denideth the inferior from the posterior muscles.

The vi. springeth from *Radius* beyng likewise adherent to the same Ligamēt and iourneth downe along the length of *Radius*, endyng neare the wiest at a

The balke of
palme of hand.
The vse of the
first interior
Muscle of the
hand.
This Muscle
maketh not the
ball of the hand
without heare.
Col. ibid.
Theues for the
most part (saye
Columbus) want
this first inter-
ior muscle of the
hand.

The perforated
tendons of the
hand.

The 4. perfora-
ting tendons of
the hand.
Gal. Lib. vi part. Li.
de anat. admini. 1.
& Lib. de motu.
Muscle.

The fourth Booke of the

round Tendon and sinewy : which together with the Tendons of the fourth and fifth Muscle, runneth vnder the coape, or bawle of the wrist of the hand, and finally is inserted to the last ioynte of the thombe, which it bolveth.

The seventh Muscle with a fleshy begynnynge commeth from the inner Tubercle of the shoulder, and from the vpper, and inner part of the cubit. It creepeth obliquely, and in the halfe space of the length of *Radius* endeth partly fleshy, partly sinewy, with oblique Fibres.

The viij. being foure square, placed neare vnto the wrist, riseth from the cubite, and fleshy also endeth in *Radius* : hauing transuerse Fibres, and transuerse situation. And the office of these two last, is in prone order to turne *Radius*.

Of the outward Muscles. The first begynneth fleshy, and sinewy fro the outer tubercle of the shoulder, the putting on more fleshyes wareth thicke it marcheth betwene *Cubitus*, and *Radius*, till it come to the wrist : wherefore sometyne it stretcheth forth in iiij. sometyne in iij. tendons, round, and sinewy, which passe through the hollow which is in the Appendance of *Radius*, but are gathered together by one of the Ligamentes which spring from the same Appendance. These sayd tendons in proceeding fourth further are broad, and end from the first to the thyrde ioynte of the iij. fingers. But when it hath onely iij. tendons, then is the litle finger without. But after hath it iij. then thre : which tendons are stretched forth euen vnto the extreme endes of the fingers vnder the nayles : but are not inserted to the rootes of them. Hereby commeth the sensible feeling that consisteth betwene the flesh and nayle, as is proued when any hurt hapneth betwene them, by the great dolour that ensueth, although the same payne lyeth not betwene the flesh and nayle sayth *Collumbus*, but betwene the flesh and the Tendons. And the office of this Muscle is to extend the foure fingers.

The second Muscle begynneth at the same Tubercle neare to the first with a sharpe begynnynge, and sinewy, so it is bozne forward betwene the first Muscle, and cubit after the longitude thereof towardes the wrist, but it endeth at a round, sinewy, and sometyne double Tendon. Likewise it is caried aboute the wrist betwixt *Radius*, and *Cubitus*, and to the extreme end of the litle finger is inserted. This round Muscle hath the office to lead the litle finger from the rest, and is no small vse vnto vs for the makynge of the Palme of the hand.

The thyrde Muscle goeth out fleshy from the middle, very neare, of *Cubitus*, in what place of *Cubitus* is a long roughe lyne, made to giue begynnynge to thre Muscles. The situation of this is oblique, and the end at a round Tendon, which is inserted to the fore finger to extend, and stretch forth the same obliquely. But this sayd Tendon chuseth a Ligament from the Appendance of *Radius*, and this Tendon is deuided in some, into two.

The fourth Muscle with a fleshy begynnynge from the cubite neare vnto the thyrde, is oblique, and caried aboute the Appendance of *Radius*, then ending at a round, and sinewy tendon, is to the thyrde ioynte of the thombe, to extend, and lead the same from the other fingers, inserted.

The fift from the same lyne of *Cubitus*, neare to the fourth Muscle, with a fleshy begynnynge, and long, marcheth obliquely towardes the thombe, with many inscriptions, and ceaseth at diuers Tendons. Wherefore (sayth *Collumbus*) he that deliteth in the multitude of Muscles, may deuide this into thre or iij, albeit he iudgeth it onely one: which is caried aboute the ij. horned Muscle. But it deuideth sometyne into iij. sometyne into v. tendons, wherof one to the thyrde ioynte of the thombe, an other to the second ioynte, the thyrde to the first, and the iij. to the bone of the wrist which supporteth the thombe : there are sometyne beside in this place found ij. other tendons: and this Muscle hath the office to extend the thombe.

The vij. springeth from the roote of the outer Tubercle of the shoulder : it embaceth

8.
The Muscles en-
clining *Radius* di-
rectly downward.

7.
The first exten-
sor Muscle of
the hand.

Col. lib. 5. cap. 34.

Why such payne
hapneth by any
solition of con-
mune betwene the
flesh and nayle.

2.
The Muscle that
leadeth the litle
finger from the
rest.

3.

4.

5.

6.

by aceth, and is knit unto *Cubitus*, cræpyng after the length therof: neuer thelesse in commyng to the wyest it degenerateth into a round sinewy, and strong tendon, which is carped about the Appēdance of the cubite into a certaine hollow, neare to the Procelle of *Cubitus* called (as befoze is sayd or described in the Hystory of bones) *Stylois*: from this Appēdaunce it taketh his Ligament, which is transverse: it is inserted mozeouer not farre from the wyest, to that Postbrachial bone that sustaineth the litle finger.

The seventh which is called the two horned Muscle, springeth fleshy, with a long lyne from the inferiour part of the shoulder about the ioynt, and cræpyng vpon *Radius*, endeth in the iniddest therof in a strong, and double tendon, (beyng therfoze called two horned) which, after it hath visited the wyest, is inserted to the Postbrachial bones, that suppozte the foure finger, and middle finger. These ii. muscles last sayd, do extend the hand, or els thus do serue to extend the wyest when both at once do labour. But the seventh, together with the second of the inner muscles, the other two ceasing, do carpe the hand obliquely downeward. So the sixt, with the thyrd inner muscle, do baire it obliquely vpward. And this is their first vse. The second is to circūuerte, or turne about the extreme hād: which motiō they shew, whē one in mouyng, doth immediatly follow an other. Which vse of other Anathomistes, I perceiue hath bene nothyng so well noted as of *Columbus*: whom for his diligence, I accompt no lost labour to imitate.

The viij. muscle, which is called the lōgest, is brought from the shoulder, with a fleshy begynnyng, about the outer Tubercle: runneth obliquely vpon *Radius*, and is inserted into the Appēdaunce therof with a membranous tendon.

The ninth is produced from the bond, whiche knitteth together the cubite with the shoulder; and passeth obliquely from the superiour part of the cubit called *Olecranon*, and beyng all fleshy, is fastened to the iniddest of *Radius*. These two muscles baire the hand vpward: and mōue *Radius* outwardly.

Muscles of the extreme hand are in number xxi. neither at any tyme moe, but sometyne fewer. That is to say xix. Of these muscles seuen (if they be the whole number of xxi.) serue the thombe. But if but xix. then are they vi. to the thōbe: foure go to the litle finger, & iiij. to euery one els, & one to the broad tendon.

The first is a little transuerse muscle, placed vpon the hill of *Venus*, & springing from the fleshy mēbran is filled with fleshy Fibres, and is inserted to the broad tendō, which to dilate it was therfoze made. And this muscle (as sayth *Col.*) was neither mentioned of *Vesalius* nor the auncient Anathomistes befoze him.

Foure other long, leane, and round muscles do follow, which goe forth from the tendōs of the fist interior muscle, which boweth the thyrd ioynt of the foure fingers. These are placed in the ball of the hand, neare the first ioynt of the foure fingers. But they end in a round, and sinewy tendon, and are caried by the inner partes of the fingers after their longitude, cleauyng to the tendons of the first exterior muscle, by which the foure fingers are sayd to be extended. So these with their endes are committed to the thyrd ioynte of the fingers, but *Columbus* denieth that they are fastened to the fist, as *Galen* and *Vesalius* haue professed befoze him, who although they knew these muscles, yet were ignoraunt of their vse and insertiō: and you shall see how: for they affirme, that by these & foure fingers are led towardes the thombe: But sayth he (and that not without a playne demonstration of his reason) by these muscles, although they lye in the interior part of the hand, are the fingers. Notwithstandyng, extended better then by the fist of the exterior muscles, or at least asmuch. And they were put of nature in the inside, because she well considered the great perill that should euer be incidēt vnto them, on the outside if they were sitēd. Whereby it soztuneth many tymes, that although the tendons of the outside of the fingers be deuided, and cut in sun-

S. ij.

der

The Procelle of the cubite named Styloides.

7.

The ii. horned tendon.

The Muscles extending the hand. The moving of the hand vpward and downeward. The turning of the hand in round compasse.

8.

9.

αλῆραι. cv. The Muscles moving the hand vpward & *Radius* outward. The Muscles to the extreme part of the hād are ii. The distribution of these Muscles among the fingers.

The fist Muscle of the extreme hand. The hill of *Venus*. *Col. Lib. 5. Cap. 35. & Vlt.*

4.

The Muscles extending the iii. fingers of the hand.

A thing very notable and little knowne.

The fourth Booke of the History of Man.

der, yet the partie beyng hole, shall afterward neuerthelesse extend the same finger, neither is the Chirurgian that cureth it, the more to be extolled therfore: as diuers that (hauing small knowledge in Anathomie) do here and there, greatly esteeme them selues, for the good successe of such cures, purchased more by the benefite of nature, then their rare experience, or singular application.

The first muscle goeth forth from the Ligament of the wrist, and fro the fourth bone therof, and it constituteth the hill of *Venus*: It marcheth forth by the inferiour part of *Postbrachiale*, and is almost round: then endeth it at a *Tendon*, which is implanted to the first bone of the little finger, whereby the same finger is able to moue from the rest.

The seventh beginneth at the wrist, and is placed in the vpper part: this muscle is all fleshy, and endeth at the second bone of the thombe.

The eight commeth forth neare vnto the seventh, is fleshy and placed toward the hollow in the hand: and with a small *Tendon*, is inserted to the second bone of the thombe.

The ninth is vnder the seventh, from the same Ligament of the wrist, all fleshy, and ended at the first ioynt of the thombe.

These three muscles make that fleshy part of the thombe, which *Palmeaters* do terme the hill of *Mars*: and they draw the thombe towardes their begynnynge: that is, do extend the same, and lead it from the rest.


Three other follow, whiche go out of the bones of *Postbrachiale* that support the forefinger, middle finger, and ring finger: their situation is oblique, or rather transuerse vnder the lyne of lyfe (as the *Palmeaters* terme it) they end in the second ioynte of the thombe: albeit their begynnynge is halfe circle lyke these three (notwithstanding) could *Collumbus* be content to accompt one muscle, hauing a broad begynnynge, a sharpe end, and enterweauynge of diuers *Fibres*, sayng that he would not seme to much to dissent from *Vesalius*, to thinke (if he may) the cauelyng tauntes of straungers. The vse of them is to bowe the thombe towardes the ball of the hand.

The seventh muscle of the thombe commeth from the *Postbrachiall Bone* that bayeth the forefinger, occupying the space betwene the forefinger, and thombe so that the situation therof is ouerthwart, & is inserted to the bone of the thombe, beyng thereby authorized, to plucke the thombe towardes the same finger, and lay it aloft thereon.

Besides these, there be yet other viij. muscles, springng from the *Postbrachiall* all bones, & inserted to the first ioyntes of the iij. fingers. Of these, ii. beyng allotted to euery finger, exceptyng the thombe, in which none of them is settled.

These viij. muscles are thus endued with offices: that is. of them by mouyng together, do bowe straight the first ioynte, wherein they be implanted. But when one stretcheth onely, the obliquely they make their motion in bowing these ioynts.

And now here with myne authour, how mans members moue,
I am come to the goale.

 An end of the Historie of Muscles.

¶ The

The muscles constituting the hill of Mars.

Three other muscles in the extreme hand.

A Caueat giuen by *Collumbus*.

The seventh muscle of the thombe. The muscle that layeth the thombe aloft on the forefinger.

Eight other muscles giuen to the fingers the thombe excepted.

The muscles bowing the fingers both straight and obliquely.



Of the Hihory of Man, the fift booke describyng
the instrumentes seruyng to nourishment,
which is brought to effect, by meate drinke, that is,
Of the nutritiue and naturall partes.

Gall. lib. 1. tit. 1. cap. 1.
The necessitie of
nourishment.

Each growyng
thyng hath a cer-
tain power to re-
quite his necessi-
tie.

Lib. 6. Epid. par. 3.
aph. 1.
Nature needeth
no instructor.
How the body is
maintayned.
How the aerye
and fiery sub-
stance holdeth.
Fuch. lib. 3. cap. 1.

The necessitie of
instrumentes ser-
uyng to nourish-
ment.
The kindes of
instrumentes ser-
uyng to nourish-
ment.

Lib. 6. de anat. ad
& de nat. Fac. lib. 1.
cap. 10.

The vse of the first
instrumentes.

The vse of the se-
cond instrumentes.
The vse of the
third instrumentes.

1.
The first instru-
mentes.

2.

3.
The extreme
sk. fine called Cu-
ticula.

Cuticula some lost
& some retoyed.

Col. lib. 1. cap. 1.
Why Cuticula is
insensible.

1.
The first bristie.



When as the whole masse of man, for the insited beate therein, must needes haue runne in perpetuall ruine, and bastation, vnlesse other lyke substance continu- ally in steade of that which wasteth, was restorcd: the almighty creator, not onely vnto man and liuyng crea- tures, but also vnto the very Plantes them selues, hath given a certaine power, to require that allway, which is wantyng and requisite for them. For neither to eate, drinke, or vse respiration we learne of any bo- dy, at any tyme, but immediatly euen from the begyn- nyng, we haue in vs that worketh all these without any instructor. To this that Diuine Hipocrates hath this elegant saying: Nature her selfe hath not by reason found the insinat to euery her actions: for neither is she of any taught, neither hath she learned to worke those thynges, which are conuenient: but by meat, what soeuer of dryer substance, and by drinke, what so of moyster wasteth, we restore. And so alway to the old estate we mainteine and reduce them both. So otherwise, then as the commoderation of aerye, and fiery substance, we hold by respiration, and pulsation of the Arteries.

NOW whē that that floweth to euery part, ought to be of such nature as the particle it selfe, and none of all those whiche are eaten, and drunken, are wholly such: it was necessarie vnto Nature, first, that those thynges were conco- cted, and chaunged, and (so much as may be) assimilated, and made like to nou- rish, and restore the body, and after to expell those recrementes, whose generatio of necessitie followeth such mutations. For this cause chiefly (sayth Galen) Na- ture insituted thre kyndes of instrumentes seruyng to nutrition.

As, some for the first reason, to conceiue, and labour the nourishment, as also to distribute the same vnto the whole body. Others for the second cause, to be the receptacles of excrementes. The other particles for a thyrde reason, seruyng to the transmittynge of these excretions, vntymely excrete prohibityng, and in tyme betw readely expellyng.

Of the first number are the Ventricle which receiueth the nourishment, and the Liuer, whiche maketh the greatest mutation of the nourishment passyng through hym, and the Veynes, which deriue the same concocted nourishment in- to the whole body.

Of the second reason are the intrels, which receiue the dryer excrement, as the Vessicle of Choler, that whiche is thinner, and lighter: the Splene that which is moze earthy and thicke: the reynes, and bleddar, the watrish part.

Of the thyrde, the Muscles: for they are vnto egestion seruicable. All whiche thynges in their places shalbe described, and how they serue vnto nutrition we will declare: begynnyng first somewhat further of with the partes of Abdomen, as, of them in dissection, the Anathomist maketh first demonstration.

THE outmost skinne (therfore) which is in Græke called *Epidermis*, in Latin *Cuticula*, is the vppermost thinnest skinne, which onely most outwardly of all others enuoyappeth the body, beyng very thinnest, and of it selfe altogether in- sensible: growyng swiftly, some lost, and some repayzed agayne.

The insensibilitie therof is vnto the body very requisite: the outward partes beyng thereby freed from the dolour of ech light action, which otherwise we must needes

needes haue endured, not onely in applying our handes to the holdyng of any thyng, and passing with our fete continually to goe: but euen in wearyng also our garmentes vpon vs, no lesse then if our Bones were likewise of sensible substance, we should neither be able to go, much lesse frequent such violent actions, in the vse of our lyfe, as dayly we do.

Agayne, as Nature to so good end created it of insensible substance, so likewise she framed it most thynne; to the end the members sense should not thereby (more then was convenient, to the aforesayd end, and purpose) be dulled. Whether foze we may endure to handle, rubbe, or styre our members to, or with any thyng, which hath not either the sharpnes, or foze to excoziate the same outer skinne: which if it had bene thicker, it seemeth certain our sense must needes haue bene the duller.

Besides, an other commoditie (no lesse needfull) it oweth vnto the body. For Nature hath endowd the same with an infinite, number of pores, or holes, to expell by them such superfluites, as Nature hath already giuen to the outer partes: and infraction, these manifestly do shew them selues.

In no wise many this skinne be deuided from the second by instrument not, withstanding the foze of fire, or hoate water maketh it by blisters diuisible rise from the other.

NExt vnder this *Cuticula* appeareth the true skinne, called *Epidermis*, in Latin *Cutis*. This couereth ouer all the extreme partes of the body, the eyes, eares, nostrils, and such other places, which nature for other vses most conveniently framed.

And the skinne, not onely of all the partes of man, but of his whole substance subject to generation, and corruption, holdeth the meane betwixt hard and soft. For the skinne is as it were a Perue endowd with blood, reteinyng a certaine meane betwene the flesh, and sinew, as though it were constituted of both mixed together. But the sinew is cold, and without blood: the flesh hoate, and endowd with much blood. In the middlest betwene both is the skinne, neither manifestly without blood, as the sinew, nor playnly with blood aboundyng as the flesh.

Realdus Columbus (therein relectyng the iudgement of Aristotle, for the not beyng of sense in the skinne) sayth it is of white substance, endowd with sense, and filled with Veynes, Arteries, and sinewy Filamentes, therfore must it of foze be marueilous sensible, to haue iudgement of euery qualitie: as in discernyng the excessse of heate, cold, or such exterior injuries, it might minister alway vnto the wittes a ready knowledge therof: so beyng a common meane, to prevent annoyance to the extreme partes of the body. As for example if any man laye his hand or other part sodainely to a hoate peece of yron, or such other, in a moment the sensible mixture of the skinne presenteth it to the wittes, whereby he is moued immediatly to plucke away, or remoue hym selfe from that present annoyance.

Wherouer the skinne euery where, cleaueth not alike vnto the subject partes. For otherwise in the Palme of the hand, and sole of the fote, otherwise to the Muscullous substance of the forehead, otherwise to the lippes, eye liddes, eares, nose, fundament, yard, and otherwise throughout the whole body is it committed to the partes vnder lyeng, and in dissectyng must diuersly be separated.

Agayne among all the partes of the skinne is not alike distribution of Perues, neither alike thicknes of the skinne in all partes: for to the skinne on the inside of the hand, very many sinewy Fibres are reached, but to the skinne of the necke, few.

Likewise the skinne of the face is softer, and thinner, but of the necke, & soles of the fete, harder. That which inuesteth the inside of the hand (valesse by labour it become harder) retaineth an exquisite meane in hardnes, and softnes, betwene

Bones insensible

The tenuitie of Cuticula.

The thicker Cuticula the duller sense.

Pores.

How Cuticula is separated from the true skinne.

The true skinne called *Dermis*, and *Cutis*.

What partes are not covered by the skinne.

Gal. Lib. 1. de temp. Cap. 8.

The skinne holdeth a meane betwene hard and soft.

The substance of the skinne.

The sinew.

Flesh.

Loc. citato.

The skinne senseth agaynst Aristotle.

The necessitie of sense in the skinne.

The variatie of sense in the skinne.

Vesal. Lib. 2. Cap. 5. How the skinne cleaueth to the subject partes.

Distribution of Perues to the skinne.

Thicknes of the skinne.

Face.

Softnes of the skinne.

Palme of the hand.

The fift Booke of the

Where the skinne
is thickest.

Of motion in the
skinne.

Skinne with
heate on it.

Col. Lib. 1. cap. 1.

Pores in the skinne.

Why some sweate
lightly or contra-
ry wayes.

Vesal. Lib. 1. Cap. 5.
Fat, and how it
is engendred.

Columbus.

The vse of fatte,
Lib. de temperam.
That fatte is in
men aswell as
women, contrary
to Galen.

In what bodys
fatte aboundeth
or defecteth.

Altho' outer partes
haue the yare and
testicles haue
their fat.

The diuersitie of
fatte according to
the place.

Fat is insensible
contrary to Ari-
stotle.

Loc. citato.

An other vtilitie
of fatte.

The skinne called
Membrana Carnea.
Why it is called
the fleshy Mem-
bran.

Columbus.

The fleshy Mem-
bran vnder the
arme-hole.

Where Arteries
runne betwene
the skinne and
Membrana Carnea.

the other skinne, and all the whole body, very neare approaching to the waight with equall temperature. But euery where the skinne of man, for the magni- tude of his body, is thinner then in foure footed creatures: although in man in the necke, backe, legges, and sole of the foote it chaunceth much thicker, but not in all alike.

Also some partes of the skinne are wholly immouable, and resistant to turne, as of the palme of the hand, and sole of the foote: others apt to turne and wynde, but not by any volūtary mouyng, as the skinne of the whole body, els that which in deepe moucht excepted: as that of the forehead, and all the skinne of the face, and which betwappeth the forepart of the necke, and sides. And this of motion is participant either by proper Muscles in it seruing, as of the forehead, eye liddes, and lippes, or for the cause of the nigh partes, as the skinne of the ball of the chœkes, which being destitute of Muscles, moueth together with the next vnto it.

Furthermoze some part of the skinne is heary, as of the necke, arme-holes, priuie partes, and chinne in men: others without, as the palme of the hand, and sole of the foote.

Besides such like places before mentioned, whereby the skinne is not left per- petuall, and generally coueryng all places, it is replenished with certaine pores, and holes, where through the sweatyng excrementes of the outer partes do passe. But those in some bodys moze large, in others moze strete: whereby it com- meth to passe that some sweate lightly, and with no labour, others agayne by no exercise may be prouoked to sweate.

Next vnder this skinne lyeth the fatte of the outer partes, poured out be- twene the skinne and fleshy Membran. Whiche happeneth by the inter- course of Veynes and Arteries, whiche in those partes sweatyngly poure forth bloud: which immediatly by coldnes of the Membran and slender heate, congea- leth, and degenerateth into fatte. It is aswell knowne vnto euery body in co- lour, as substaunce: wherefoze needeth no other description, nor any such expli- cation as other partes.

But as touchyng the vse therof, it is by softenes a fitte propugnacle to the ou- ter partes, and a perpetuall sustenaunce vnto them: which although Galen affir- med to be plentifull in women, and litle or none in men, yet we see for certaintie, that it is founde in yuen euen as in women: moze plentyfull in some, and with lesse store: but the truth is that in colder bodys it is copious, and in hoater very scarce. And foreprose, laye a part the yare, and purse of the testicles, and in all the other partes fatte may be found: and if you way the vse and mouyng of such as want fatnes, you shall easily finde out the reason of the diuersitie.

The substaunce of fatte is not euery where alike: for in the Palme, and sole of the foote it is almost fleshy, and hard, made so for the necessary mouyng of those partes: but is not the organ of sense, as Aristotle imagined.

Also Vesalius affirmeth it a coate vnto the subiect partes: to conserue and keepe their heate in tyme of cold, and to coole them in tyme of heate.

Vnder it lyeth a Membran called fleshy, in Latin *Panniculus Carnosus*, or *Membrana Carnea*. This is the fourth inuolucere, betwappyng all the body from the head, vnto the sole of the foote. It is called fleshy, in respect of that in the necke, and in respect of all other Pannicles in the body. And the elder sorte called it fleshy (as it seemeth) because that in children it is fleshy, and filled with many Fibres, which neuerthelesse in tract of tyme do banish away.

But vnder the arme-hole this Membran is not fleshy, as Galen affirmeth *Lib. 1. de Anat. administ.* Wherby appeareth he imitateth to much the bodys of Apes, and beastes, but it cleaueth to the Muscles them selues: betwene which, and the skinne small Veynes do runne, but bovyde of Arteries in all places, except in the temples

temples, head, yard, parte of the testicles, and fingers, in which places certaine Arteries (though fewe in number) are found running betwene the skinne, and the same Membran.

This Membran is as it were the gate, or entraunce for the Veynes, & sensible Fibres of the body, to passe through for sense, and nourishment vnto the skinne.

Of face it must be very sensible: not onely in respect of the Fibres that come through, but principally because it selfe is most of finewy substance. For it may be that in children it be fleshy, but in elder persons it retaineth small fleshy parts, save that in respect of other Membranes, it seemeth somewhat more fleshy, and partly already is touched.

After this appeareth in Abdomen, and as it were describing it in the midst, a line, and round pitte, called the nauell, of the Latins *Umbelicus*: and the lyne, or hollow spring from it, for the whitenes therof, *Linea Alba*, the white lyne, or of some, the Vmbellicall Veyne.

This Nauell Galen and Aristotle supposed to be situate in the midst of the body, but *Vesalius* contrary thereto with many (I will not say frivolous) reasons repugneth, which *Columbus* agayne hath surely suppressed, affirming that of right, it occupieth the middle part of the body, since whilst we are in the wombe of our mother we are nourished thereby, and by the same also put fourth our excrementes.

The begynnynge hereof is at the Matrice, and springynge upward to the nauell passeth in thereby to the liuer and endeth in *Vena porta*. But the Arteries (for so it is the receptacle of iiii. notable vessels) inserted to the nauell, and reached downward to the sides of the bottome of the bleedar, are continuall with the branches of the great Arterie, after the principall diuision therof aboue *Os sacrum*. For the Arteries makynge entraunce into the nauell, are united to the strokes of the great Arterie whiche descend into the legges, as hereafter shalbe exprest more fully. By the benefite of the vmbellicall Veyne the child in the wombe is nourished, and by the office of the Arteries is replenished with infused heate, & vitall spirite.

There is a fourth vessell called *Orrachos*, which begynneth at the bottome of the bleedar, and serueth to draw the Urine from the byzth. And this together with the other vessels, the midwines do cut of, neare to the belly, so that after the infant be bozne (save that it remaineth as a certaine corde or bande vnto the body) we finde not any notable vse therof.

As for the Muscles of Abdomen, which in the Hypozie of Muscles are so copiously handled, I commit the to the reading of the second booke. But here, because no where els we haue described the nature of fleshes, which so plentifully belaypapped the frame of man, ech where clad therewith, it shall not be amisse to say somewhat, to the end we ouerscape nothyng woorthy, or needefull to be declared vnto the yonger sort.

Flesh therfore is a simple member, neither solid, nor absolutely moyste, but thicker then the moyste partes, and softer then the dry. It is begotten of blood meanelly dyed: whereby it hapneth that bodies aboundynge with blood be very copulent, and fleshy. So necessary it is vnto the body, as that nature hath left no part destitute thereof, the brayne excepted, but either is in them contained or neare vnto them adioyned: fulfilling so, all the partes of the body, like the plaster, or daube vnto the latted house.

Of the flesh are sondry diuisions, diuersly set downe by sondry Authoꝝs heretofore: as some of them affirme thre kyndes, of which, that is the true and simple flesh whiche groweth in the gummies of the teeth, and head of the yard. The second is vniuersally mixed with the Muscles, beynge euery where compounded with finewy Fibres, and diuerse substances according to the nature of the place.

Some authors say
of the sensibility
of the fleshy
Membran.

Of the sensibility
of the fleshy
Membran.

The description of
the white line &
nauell.

The situation of
the nauell.

The desitie of
the nauell.

The rising and di-
section of the
white line.
Fuch. Lib. 4. Cap. 4.

The vse of the
vmbellicall beins
to the infant in
the wombe.
Col. lib. 11. Cap. 18
Orrachos.

What is fleshy.

How fleshy is en-
gendered.
Gal. 10. de temper.
What part is
without fleshy.
Whereto the office
of fleshy is com-
pared.

Of the kindes of
fleshy.

The fift Booke of the

The author hath
hereby digression to
speake of Gland-
ules.
Col. Lib. 9.

Glandule of the
neck what it is.

The office of the
Glandules.
Col. Loc. cit.

1.
Glandula Pinealis.

2.
Glandules of the
skull.

3.
Of the eyes.

4.
Whence teares
proceede.

5.
Of the lawes.

6.
Of the tongue.

7.
Of Larinx and A-
spera Arteria.
Why the throte
boucheth not
forth so much in
women as in
men.

8.
Of the cancell bone.

9.
Of the AEophagus.

10.
Of the Abdomen.

11.
Of the ventricel
called Panchreas.

12.
Of the neck of the
bledbar.
The testicles in
substance differ
little from Gland-
ules.

13.
Of Glandules in
the exterior
partes.

The third sort is that of the Glandules, or kernels: which third part, because it is so much different from the other I will somewhat digresse to speake of them, that is, the Glandules, not binne defull, nor improvidently made of nature.

As they are no other then a round body somewhat long, (for the most part) being rare, and filled with moisture. For divers caples in divers places nature hath set them: but their generall proppertie is to turne the blood which they receive, into their colour. Notwith- standing their uses be divers. Some are strewed as beddes vnto Veynes, and Arteries, to defende them fro hurt: others fulfill bope places: others to receive and containe humidities, least any place through mouyng might be dried: others to receiue excrementes. And those kyndes of Glandules are to be found in diuers partes of the body.

The first in the Scull after this sort, one in the brayne, betwene the same and Cerebellum, which is called Conarion Pineale, described her easter in the Hystorie of the brayne and Acrues. This is round but somewhat long.

An other in the cell of Sphenoides, lyeng without Dura mater, in which endeth the bason, or tonnell. What is ment by the Cuneall cell thou hast learned that in the Hystorie of bones. And this is that Glandule whiche taking in the excre- mentes of the brayne, sendeth the same afterwarde to the nose and Palate.

In the roundell of the eyes are foure Glandules, two to euery one, the right and the left: that is two above, and the rest beneath. Where they are placed of nature to receiue the superfluous humiditie that commeth to the eyes, and there- with to moisten, and refresh them, lest they by often mouyng should dry vp, and afterwarde giue ouer to moue. These are they which, being by sorrow, or other cause constrained, do poure out teares.

There are other two Glandules in the iawes called Paristhymia receiuing al- so the humidities of the brayne, to moisten those partes, which is greatly neede- full, when as continually in speaking, eatyng, inspiryng, & expiryng they labour.

Others likewise we finde vnder the roote of the toung, small, and possessing the same vtilitie as before is sayd.

Two other cleaue vnto Larinx, and the rough Arterie, thicker in women then in men, whereby it commeth to passe, that the prominent part of Larinx in felse women is apparant: the thicknes of these makyng euen with the same.

Under the Cannell bones also, where Vena cava is deuided into two, that is, Axillarem and Inguarem, are other Glandules slender in vs, but thicker in beastes, called Lactes and Thymus.

Agayne, in the hollow of the brest are other two ioyned to the middest to Esophagus, to moisten continually the same whereby the meate may passe, and slide downe moze easely.

But in the bale of Abdomen there are not ij. but an innumerable sort found, throughout Mesenterium, dispersed for the diuision both of Veyne, & Arteries.

Amongest which vnder the Ventricle is a certaine notable one, there set aswel for the diuision of Vena porta, as also to be vnto the Ventricle as a propugnacle, lest in touchyng their backe, it should happen to receiue hurt. The name therof is Panchreas, that is Affusio, lyng flat, or prostrate.

At the roote of Penie, and in the necke of the bledbar, are two litle thicke Glandules called Parastates, and Asidentes, sittyng downe, or restyng. These receiue, and containe the seede brought thether by Vasa deferentia, as her easter among the partes of generation shalbe playnly taught.

And among the Glandules likewise may be accompted the testicles of the ma, or woman: for in substance they differ little.

And since we haue expessed the Glandules of the inner partes, and that it is very

very necessary to be perfectly instructed also of those that lurke in the exterior members, we will speake somewhat of them before we passe, although I make hast to come agayne to the fleshes.

It is to be noted therfore, that neare unto the eares, as also vnder the nether iaw lyeth many Glandules, which serue both to the diuision of Vepries, and Arteries, and to the receiuing of certaine superfluities of the brayne, being therfore called the Emunctorie places of the brayne. These be sufficient great and thicke: wherein oft tymes chaunce those abscesses, called of the Grekes *Parotides*.

Moreover vnder the armehole are not a fewe of them, begotten for the causes afoze mentioned. Which place is called the Emunctorie of the hart.

In the flanke besides that, betwene Abdomen and the thigh, are many Glandules to the same end and purpose ordained: this region beyng called the Emunctorie for the liuer.

Neither is the bought of the cubite, and knee utterly destitute of these Glandules, although but small, made for the vessels diuision.

Some agayne haue them in their necke, armes, and legges. But those moze seldome.

Albeit the whole substance of the pappes is Glandulous, and fat, beside the nipple: whiche Glandules nature consented to make white, that thereby accor- dyngly they might conuerte the red blond into white milke: since euery thyng that is altered in the body, chaungeth into the colour of the same that altered it.

The Glandulous substance of the pappes was put so in the interior part of the breast, both for elegancie of forme, as also to be yeldd moze fitly vnto the infant in giuing sucke: beyng reposed betwene the skinne, and fleshy Membran. And this brief I chose as a sufficient descriptio of the Glandules: which (now to come agayne) as is aforesayd, is accepted of some, a third kinde of flesh in y body.

Notwithstanding all the soft partes of the body, both inward and outward are generally comprehended vnder the name of fleshe: as of the outward partes, the Muscles, Glandules, gummies, &c. of the inward partes the hart, brayne, liuer, lunges, spleene, reynes, intestines, &c. Among all which, there beyng not two alike in substance how can the aforesayd diuision stand true: as for example, what part of the body is of such substance as the hart: What is like vnto the liuer: is any of such matter as the spleene: Which (although I omit to speake of the rest) are sufficient (in my iudgement) to disproue the triple diuision.

Besides this, neither is the head of y yard, neither the gummies (which they would haue to be the onely true fleshe) alike one an other, but differ almost as much as the rest. Galen therfore to this purpose sayth there be many kyndes of fleshes, and that simple flesh is to be found no where, without the mixture of other partes. When if we deuide the fleshes into three, and almost all the partes of the body so diuersly vary in substance, how may this diuision stand: when among diuers partes be diuers substances, yea and diuers temperatures, if Galen haue sayd truth, that the sanguin partes are hotter then those without blood, and so accor- dyng to moze or lesse?

But further to omit long discourse, and therewith the opinions of diuers, *Vesalius* most properly (in my opinion) hath deuided the fleshes into two, that is, the proper, and improper. And truly this is that which my coniecture sheweth at. For considering that some is hard, some soft, some inward, some outward, some begotten of blood meanly dyed, some moze hard, some moze slacke &c, it shalbe sufficient inough with *Vesalius* to deuided them into two, and so (if it be lawfull) to call the proper *Sanguinea*, and the improper *Exanguis*. As that to be proper, or *Sanguinea*, which is engendred of blood: of what sort is the flesh com- pounded in the Muscles, the hart, and all the rest of sanguin substance. And that

1.
Glandules of the eares and nether iawe.
The Emunctorie places of the brayne.
Where groweth the abscess called Parotides.

2.
Of the armehole.
The Emunctorie of the hart.
Of the flanke.

3.
The Emunctorie of the liuer.

4.
The use of the glandules about the bought of the cubite and knee.

5.
Where are glandules moze seld.

6.
The use of the glandules in the pappes.

The pappes are altered changed to the colour of that that a teateh, why the pappes are on the breast.
Some say they accept the glandules the third fleshe.
All the soft partes are generally named fleshe.
Wares diuers in substance.

The substance of the head of the yard and gummies is not alike.
Lib. 2. de Temper.
Simple flesh is no where in the body.

Diuers partes haue diuers substances and temperatures.

Epit.
Two sortes of fleshes.

The proper flesh.

The fifth Booke of the

The improper
Self.

Mirach.

Gal. vi. part. Lib. 4.
Siphach.

The description of
Peritonæum.

Col. Lib. 11. Cap. 11.

The figure of Pe-
ritonæum.

Vesal. Lib. 4. cap. 12.

Peritonæum one of
the similar partes.
The beginning of
Peritonæum.

The end of inter-
tion of it.

Peritonæum com-
pared to a bottell.
The length of it.

The inside of Peri-
tonæum.

Col. Loc. cit.
What partes peri-
tonæum clothe.

Lib. 4 vi part.
The uses of peri-
tonæum.

improper, or *Exanguis*, which containeth not blood, but is of nature for other no-
lesse use ordained, and created: as is the braine, the sinewy partes, Glandules &c.

Hitherto all the partes spoken of, together with the Muscles of the belly de-
clared other where, are comprehended under the name of *Mirach* (for so the *A-*
rabians call it) or more properly after *Latins* *Abdomen*.

Now followeth the *Membra* named *Siphach*, or *Peritonæum*, which, enclo-
sing more nearly all the nutritive partes, that is, betwene *Septum transuer-*
sum and the thighes, is a thinne coueryng, but strong and tough, made of si-
newy substance, enwrapping thus the lower belly, from the left to the right
side, and goyng by the gutte *Ilium* vnto the turnyng ioyntes of the loynes, com-
passeth all the bowels and partes within *Abdomen*. The upper part wherof clea-
ueth to the lower part of *Septum transuersum*, and the nether part, vnto the bones
of *Pubis*, and *Ilium*. Wherefore the Grecians named it *Peritonæon*, wherehence
the *Latins* haue borrowed this word *Peritonæum*: As that, which forgardeth,
and circumspecteth all the subiect vessels and bowels: no other wise then as the
whole canitie of the breast, together with all the inner partes which the breast con-
taineth, are clothed, and compassed about with the *Membra* called *Pleura*. *Peri-*
tonæum is in figure somewhat round, strongly knit vnto the Spine, where it
sheweth it selfe also thicker: and it is so thicker neare the Spine, because from
thence it was to be deuided into many partes.

It is a *Membra* of thinne substance, like broad & continuall spider webbes,
with no Fibres at all intertered. Wherefore is accounted in the number of the
first of the simple bodies, called *Similar partes*. And it is among all other simple
Membrans of the body, the largest, and greatest. The beginning wherof is taken
on each side from the *Ligamentes*, which do connect, and knit together the *Verte-*
bres of the loynes, and which commit *Os sacrum* to the bones of *Ilium*. Thus fro
them, as a broad *Membra* deriued. And ascendyng immediately from other side,
is couered over with the Muscles of the loynes, and with these, which occupieng
the insides of *Os ilium*, giue motion to the thighes, and with Fibres cleaueth to
them, such as we see Muscles in them selues committed together withall. But so
sone as it hath surmounted the Muscles, it stretcheth forth to the inside of the
transuerse Muscles of *Abdomen*, & to the whole inferiour region of *Septum trans-*
uersum, most firmly growyng to them, or especially to their sinewy tenuities.

Vesalius sayth, *Peritonæum* representeth the figure of a long bottell, lyke an
egge, the length wherof pertaineth from *Septum transuersum*, downe to the
lowest seate of the amplitude, whiche *Os sacrum* together with the other *Bones*
committed to his sides, effourmeth.

Furthermore the inside of *Peritonæum* reacheth out certaine Proccesses to those
instrumentes which it containeth, both bynding them thereby together, and also
knittynge them vnto it selfe, not denyng to bestow of euery of them an inuolucere,
besides their owne peculiar coates, whiche they vnto them selues do properly
possesse. Wherefore, besides that *Omentum*, and *Mesenterium* are from it natu-
rally deriued, and *Septum transuersum* (as is aforesayd) clothed, it inuelteth the
liuer, and not so alone the liuer, but also the spleene, ventricule, intrels, reynes,
vinarie wayes, bloodar, and matrice in women, with Veynes, Arteries, *Per-*
ues and Glandules.

Galen reciteth sundry profitable uses of *Peritonæum*. As first that it couereth
all the subiect partes and vessels under *Septum transuersum*: as the Ventricle,
intestines, the kell, *Mesenterium*, liuer, spleene, reynes, both the bloodars and
(in women) the matrice.

Secondly, that all whiche it embraceth, it deuiddeth from the outer coursing
Muscles, lest any of the small intrels slippe into the spaces betwene them, and so
(whilst

(whilst they presse and strayne together) be grained with payne, the Muscles hindered of their mouyng, and the excrementes contained in the intrels, downwardes difficultly transmitted.

The third vse of it is to dzyue out the excrementes of dye nourishment, together by the helpe and labour of *Septum transversum*. For *Peritonaeum* in the superiour extremities therof, commyng to the brest and false ribbes, after the manner of *Septum transversum*, somewhat aydeth the compressive motion of the Ventricle and intrels. For by this same *Peritonaeum* and *Septum*, as by two handes ioyned together aboue, but distaunced beneath, what soeuer lyeth in the midst is compzessed, and the excrementes of meate downwardes compelled.

Fourthly, beyng therewith compassed as a coate or indolure, it might conserue and bynde altogether, lest the Ventricle or intrels beyng left to slacke, should by euery light occasion be filled with ventositie. For when these become moze infirme and weake, then that easily they can be dzatone together, immediately with vapourous and windy spirites they are filled from euery meate. In the meane tyme, of necessitie it followeth that the meate is left destitute of concoction, and distribution therof in the body slowed.

The fift, and (as *Euchsius* sayth) most principall vse of *Peritonaeum* is to containe all the bowels, and vessels vnder *Septum transversum*, and as by a certayne skynne euery of them, beyng particularly couered, might safely be bound together, and in their fixed seates abyde. For the continuitie hercof beyng violated and broken, bringeth no small daunger, especially if any of the interiour partes be also wounded. But it alone broken, the disease ensueth called in Greke *κατακλις*, in Latin *Ramex*, and in English a rupture.

And beyond all this *Realdus Collumbus* teacheth vs an other vse therof, which heretofore of no man hath bene marked: that is, from the halfe space of Abdomē vpwwardes it is a simple Membran, but from the natiell downwardes doubled: the vse of which reduplication is, first for the Arteries called *Vmbelicales*, for the vessell named *Oiragos*, for Veynes and Arteries ascendyng vnder the straight Muscles of Abdomen, which vessels betwene this same reduplication of *Peritonaeum* are contained, all which he reporteth neuer any man to haue found out before him as also for the bleedar: and agayne this same doublenes of *Peritonaeum* is a meanes, that the intrels might moze strongly and safely be contained.

Peritonaeum finally is in the inside smoth, but without rough, to cleaue vnto the sayd Muscles and their tendons moze strongly. In many places it is perforated, but not so oft (sayth *Collumbus*) as *Vesalius* imagined.

From the partes of this same *Peritonaeum*, procedyng on both sides from the backe, commeth this same *Omentum*, called of the Grekes *επιπλοον*, in English the Kell. Which meetyng on both sides ouerthwart the bellye, passe vpwward euen to the stomache, and vppermost part therof: beyng a fat Vannicle or couerong, simple, & without Fibres, but aboundyng with Veynes, Arteries, sinewes, and fatnes. It is situated aboue the splene, and in the forepart of all the intrels, and is stretched out to the hollow of the liuer, to the posteriour part of the Ventricle, and almost all the whole bottom therof.

The fashion of it is lyke a satchell or bagge, hauyng a round Orifice, and higher in posteriour then in the Anterior part ascendyng. After the same manner, we call one part of the Kell the Anterior or superiour Membran, and the other the inferior or posteriour: although in dede the Kell be onely one Membran, and that especially in dogges, the Anterior part beyng one and continuall with the posteriour, and so the Kell, after the manner of a bagge, both constitute a cautie, which may be filled. All which shalbe moze euidently discerned, if the same (deuided from the partes of the backe and bottome of the bleedar, beyng in

3.

The vse of
Septum transversum
and peritonaeum in
mouyng excre-
mentes.

4.

How Peritonaeum
aydeth concoction
and distribution.
Lib. 3. cap. 2.

5.

The hurte that
ensueth perito-
naeum being rup-
tured.
The Rupture.
Loc. cit.

6.

A new vse of peri-
tonaeum.

The vse of the re-
duplication of peri-
tonaeum.

The vse of the af-
fectyue of peri-
tonaeum.

Gal. Lib. 4. v. part.

Omentum
The compasse of
the Kell.
The partes con-
stituting the Kell.
Situation.

Vesal. Lib. 5. cap. 4.

The figure of the
Kell.

The fift Booke of the

no other place broken or perforated) you couet to fill ether with liquid, or Solid substance.

The progresse of the hell.

Furthermore like a round orbicular circle, beginning from the middes of the backe vnder the posterioir part of the Ventricle, it is caried by the hollow of the liuer, after the bottome of the Ventricle (from whose thyd coate there it springeth) to the hollow of the Splene and so vnto the middest of the backe, as it were with his begynnyng. Therfore the whole inferiour halfe circle, from the hollow of the Splene by the backe, comynge even vnto the right side of the Ventricle, doth constitute the inferiour Membran of *Omentum*. But the superiour is formed by that part of the circle, which is brought from the right side of the Ventricle by the bottome therof, vnto the hollow seate of the Splene. Hence both mutually meetyng, are also downwardes dilated about the intrels, and vnder *Peritonaeum*, and couereth them both before, and on eche side: stretchyng downe to *Os Pubis*, with his lower extremitie.

The inferiour part of Omentum.

The superiour part of Omentum.

What partes are tyed to the hell.

These Membrans are with no tyinges bound vnto the intrels, save the inferiour Membran onely: which in men, is strongly continuall vnto the intestine Colon, and that all the length therof that marcheth vnder the bottome of the Ventricle. Neither may this be negligently in man obserued: when as the inferiour Membran of *Omentum* seructh to Colon, there in the steade of *Mesenterium*, whereby the same is reached out to the Ventricle. For Colon in all that space requirerh no part of *Mesenterium*, farre otherwise then in dogges and Apes. For in dogges it cleaueth to no intrell, and in Apes retaineth a meane betwene both, which made Galen also differ.

Why the hell is knit to Colon.

Vesal. Loc. cit.

The veynes enfolded in the hell.

The Veynes enfolded in *Omentum*, makynge so the image of a nette, are onely the braunches of *Vena porta*, but none from *Cana* cometh to *Omentum*. They are scattered out from that braunche of *Porta*, whose principall portion is drawne out vnto the Splene: So thence innumerable braunches of Veynes runne abroad in the Membran of *Omentum*, not straight forth, or with direct trases, but with a boundaunt oblique courses, and wandryng walkes: like as in the maner of weaueynge of nettes is to be seene.

The Arteries of Omentum.

The Arteries of *Omentum* bryake of from those, which to the Ventricle, liuer, Splene, & vesicle of Choler are distributed. These all together with the Veynes, *Omentum* safely leadeth, and to his Veynes from them obtaineth fellowly mates, so that there are fewe surcles of Veynes to be found not associated with like portion of Arteries.

The Nerves of Omentum.

Agayne, *Omentum* is (thyddly) enterwouen with those Nerves, which from the portions of the vi. payre of the brayne, reached after the ribbes, are emplanted to the liuer, Splene, and Ventricle.

The fatte.

But the fat wherewith *Omentum* floweth in dull and fat ment, is abundant, but in leane, litle and scant.

Gal. 4. vi. part.
Lib. de diff. ve.
Panchreas.
The brittle of
Panchreas.
Gal. vi. part. Lib. 5.

Beside that, which is common to both the Membrans, the inferiour Membran therof, where it is strewed vnder the posterioir seate of the Ventricle, hath specially a certaine great, and notable Glandulous body, which because that in dogges it is red, and after a certaine maner like simple flesh, the Grecians therfore call it *Calicreas*, and *Panchreas*. But in man it appeareth more white then red: situated there to *Vena porta*, and to the braunches of Arteries and Nerves for their secure deriuation, onely bolstered by the inferiour Membran of *Omentum*, and layd vnder the Ventricle to enrich the same with ease. For all the vessels, eue where they begyn to deuide & ramifie, there also do they easely incurre damage, as if any euill be incident vnto them through violent moyning, that part which was lately deuided, doth immediately incurre the same. Nature therfore not rashly, where (of Veynes) such distribution, & diuication ought to be made, placeth

placeth this Glandulous body, to enwrappe the, and fulfill their denitions: that none of them for lacke of defense, should be soyled, but resting in a body soft, and meanelly yelding, although they happen to be prouoked with a more vehement mouyng, yet because they are not shielded with hard and stubburne partes, but such, as by lightly receiuyng them, do gently exolve the violence of euery motiō, they are from hurt, breakyng, or straying perpetually conserued.

This body is called *Pancreas*, that is, all carnous or fleshy, for that it is made and confected of Glandulous flesh. But *Calicreas*, because it is sweete and pleasant in eatyng.

To declare briefly therfore the vses of *Omentum*, it enfoldeth the bꝛanches of *Porta*, and them enfolded leadeth to the Splene, Ventricle, *Duodenum*, and *Colon*. And not onely those bꝛanches, but also the Arteries and *Perues*, which to the sayd places were also to be inserted. And this *Vesalius* iudged the greatest and most excellent vse therof.

Agayne this is not the least, that by it the Ventricle is bound to the backe, and agayne the liuer, and splene knit vnto the Ventricle, together with the interuerture of vessels, and sinewes. And beyng to the intrels accidentally made an inuolucure, doth cherish and continue that hart like a cloth, or stomacher. Wherfore such as haue *Omentum*, or any part therof cut away, they feele the Ventricle, or stomach (as most the common sort terme it) colder, they digest lesse, and stand in neede of outward helpes: chiefly if the part that is taken away be in great quantitie. Wherfore the Bell is not to be robbed of this benefite it yeldeth to the surtheryng of concoction.

The instrument of which operation is the Ventricle, which is that part of the body, into which liuyng creatures receive their meate ordained by nature to make of the same susteynyng, by concoctyng & makyng the first mutation.

Under the bꝛest and *Septum transversum*, next betwene the liuer and splene it is seated, obtaining a passage, which reacheth in the meates frō the mouth, called by all these names: as *Esophagus*, *Stomachus*, *Gula*, and after the *Arabians*, *Meri*.

The begynnyng of the stomache is at the rote of the toung, in the lower part of the iawes behynd *Larinx*, to which it is knit, and not to it onely, but also to the Anteriour body of the Vertebres of the necke. This receiuyng the meate, compelled thereunto by agitation of the toung, driueth it downe to the dilated partes thereof.

The substance hercof is sinewy, and Membraneous, made therfore to dilate, & readely gather together agayne, enterwouen with Fibres ministryng vnto his office. The rest of this body is very rouē, and within excellent smooth & slippery.

It consisteth of two proper coates, one specially differing from an other in substance, hardnes, thickenes, and kyndes of Fibres. The first of these, or inner coate is more sinewy, hard, & somewhat thinner, & with the coate of the mouth & palate continuall, endewed with straight Fibres to the attraction of meate, as handes. But the outer coate is thicker, softer, more fleshy, almost participatyng with the Nature of Muscles, and with transuerse or circular Fibres abundant.

And thus nature intended onely to place two kyndes of Fibres in the stomach: as the straight to attract, and draw the substance, and the transuerse to driue it down: neither had any moe bene commodious. For had there bene any of oblique race, the meate must nedes with ouer long delay haue taried in the stomach, to the no small greuaunce of the body: for asmuch as the stomach filled with meate, if very long it should be distended, must nedes ouer long also be a let, whilest they are dilated, vnto the lunges, roughe Arterie, and also great Arterie. Nature therfore so prouidently contriued the seate of the stomach, reachyng through the necke and bꝛest vnto the Ventricle, exactly vpon the myddest of the Vertebres of

℥.iiij.

the

Why nature in sundry partes layeth Glandulous bodies.

Why it is called Pancreas and why Calicreas.

Vesal. Lib. 5. cap. 4. The vses of Omentum.

The needfullnes of the bell.

The ventricle.

Why the ventricle was ordained. The situation of the ventricle. The neck of the ventricle called. Stomach. Col. Lib. 11. cap. 4.

The beginning and progresse of the stomach or necke of the ventricle.

Vesal. Lib. 5. cap. 3. The substance of the stomach.

Teste etiam Gal. Lib. 3. de nat. fac. & s. 4. v. part. The coates of the stomach. The Fibres and ther vse.

Why nature placed but ij. kyndes of Fibres in the stomach.

The notable difference of the stomach downe to the ventricle.

The fift Booke of the

the necke, and the foure first of the brest, inclining to nether side, but so softly vnder the rough Arterie placed, as by no meanes to molest ϕ organs before named.

Agayne at the begynnynge of the fift Verebre of the brest, the stomach, that it might giue place to the greater trunkie of the great Arterie, marchyng after the Verébres of the backe to the lower partes of the body, somewhat declineth to the right side from the middle region of the Verébres, creepyng neare to the same Arterie downe to the ninth Verebre of the brest: from the body of which Verebre it is immediately eleuated, and departyng further of the same Arterie (left in swallowyng the meate it might fortune to be compressed) penetrateth at length the sinewy part of *Septum transversum*, towardes the left side, but neuerthelesse is altogether estranged from that hole, which the great Arterie, in fallyng downe to the inferiour members, occupyeth: for it hath one petular to it selfe, and to the Perues therewith descendyng, prepared.

After all this, at the begynnynge of the ix. Verebre of the brest, the stomach, by the interuenture of *Membrás*, produced from the Ligamentes of the *Spondilis*, is to the bodies of the Verébres committed, and posseseth from those *Membrás* a thyrd coate, as it were, of his second an inuolucure, mingled with no Fibres at all. But, that, neare to the fift Verebre of the brest, the stomach sheweth it selfe rather on the right then on the left side of the Arterie, the Arterie it selfe is the cause, not as a ty ϕ an occuppyng the middle seat of the backe, but whilest it taketh his begynnynge from the left Ventricle of the hart, and by the rest of his way is subiect vnder *Vena cava*, towardes the left side, of necessitie in greater part to the left side bendyng: and therfoze, somewhat giuyng place to the stomach, admitteth the same a fellow or companion of the seate of the Verébres, so that the stomach might be lesse oblique, or crooked, and obteyne also firmer seate then in the left side might be found.

Furthermore the stomach both not perfozate the right side of *Septum transversum*, neither is stretched straight into the Ventricle from the right side of the backe, but beyng caried aboue the Arterie, and oblique or crooked, with an obtuse or blunt cozner, seeketh the left side, lest the stomach in going to the Ventricle, should haue bene compelled to perfozate the liuer, which occupyeth all the right side of the inferiour region of *Septum*: but freely findeth out that part in *Septum*, where as lesse of liuer beyng, yeldeth easie passage thereto. Such is the thinner portion of the whole liuer, stretched to the left side of *Septum*, as that in the posteriour region therof, where the stomach goeth through *Septum*, it hath a cavitie like a halfe circle engrawen for the stomach, whose Anteriour part it amplecteth, ther to in proportion agreeing.

But it sufficed not nature to giue vnto the stomach so oblique, those sayd Fibres, for the speedy passage of meates, but also, to the end his concauitie might alway be with moysture annoynted, she hath placed Glandules both in the iawes, stomach, and *Larinx*. Which perpetually, lest those organs should be dryed, prepareth them humoz, and spittle. The Latins terme them *Tonsilla*.

Also in the middle space of the stomach, where the same is subiect to *Aspera Arteria*, in that place as it is deuided into two trunkes to the lunges, two others are put, not onely befoze the stomach, but also cleauyng to the sides and posteriour part therof: playnly aunswerable to those, wherewith nature hath compassed the begynnynge of the necke of the bleddar in men. For euen as these do irrigate, and moysten the way of Urine, and seede, so the Glandules fastened to the stomach humect his amplitude, and, lest by drynes the meate should with difficultie fall into the Ventricle, do imbue & washe it with a certayne spittelly humoz.

The stomach, immediately as it hath penetrated *Septum* in the left side of his sinewy part, is made cōtinuall with the body of the Ventricle, which touchyng a great

The stomach pecteth not *Septum transversum* in the way of the great Arterie.

Whence the stomach hath his third coate.

Why the stomach in descendyng declineth toward the right side.

The stomach endeth not in the right side of the Ventricle. Why the stomach in descende creepeth into the left side.

Where the liuer giueth place to the deuide of the stomach.

How more speedy passage of meate through the stomach was prepared. The Glandules called *Tonsilla*. The vse of those Glandules in the middle space of the stomach.

Where ϕ stomach is with the Ventricle continuall.

great part in the left side, of *Septum*, vseth the whole region of space betwene the liuer and splene. But in the right side, the Ventricle no where toucheth *Septum*, but all the right side, & whole superiour part thereof is hidde of the liuer: being so much therfore distant from the midriff as the thicknes thereof cometh to on that side.

The figure thereof is round, & somewhat therewith long, from the right stretching to the left side, assimilated of *Colubus* to a gourd long, & round fashion: round, because all round things are more capable, and lesse subiect to injuries: but long, because so, both the place wherein it is contained, and also the two Orifices thereof, one whereby it receiveth meat, the other whereby the same conducted is thrust downe into the intrels, do require.

In the left side also it is much more ample, and round, a little putting forth toward the inferiour partes, and thence forth with turning to the right side, is by little & little gathered together to a strete, & in the vpper part descendereth, but in the nether ascendereth: so that in the right side it becometh much more slender then in the left. Also in the superiour part thereof, which pertaineth to one Orifice to another, it is more strete and narrow, as in the inferiour, larger and broader.

In the Anterior part it is equally every where Gibbous, and no where depressed. In the posterior region it sheweth after a certaine maner two Gibbous partes, one on the left side, and the same greater, and longer put forth: another on the left side lesse and more depressed. And those bunched partes make a certaine cavitie, or impression after the longitude of the body, to the posterior seat of the Ventricle impressed. For in what place the Ventricle respecteth the Vertebres of the backe, and the descendent trunks of the hollow Veyne & great Arterie to them stretched, that it might fit it selfe every where to the place there assigned, the posterior region thereof is inwardly, as into his owne amplitude, somewhat impressed: although the Ventricle being alone from the body, and blowne up, sheweth not the same.

Two Orifices hath the Ventricle, one whereby the meate and drinke is received, which consisteth in the highest seat of the left part of the Ventricle, because the stomack there fitly perforating *Septum*, might first growe unto the Ventricle, and be made one common body therewith. The ancient Greeces do call this *καρδια*, but we (after the Latins) name it the vpper mouth of the Ventricle. And although it be in the left side, notwithstanding it cometh nearer to the middle seat thereof then to the left side. Wherfore Galen sayth it is sited under *Mucronata Cartilago*, as under a certaine propugnacle and defence.

The other Orifice of the Ventricle, transmitteth the meates changed, into the intrels. Whence the Grecians call it *πυλωρος*, the Latins *Intor*, but commonly the nether Orifice, or mouth of the Ventricle. This Orifice is in the right side, and constituteth the beginning of the intrels. Hence it hapneth that the first intrell called *Duodenum*, many haue named the beginning.

Moreover the Orifices of the Ventricle not onely in situation do vary, but besides, the nethermost is more strete then the vppermost, because sometyme are swallowed hard, great, and vnbroken lumps: for whose ingresse, it behoued the way of the Ventricle to be large, and ample. But beneath (contrariwise) since nothing passeth that is raw, hard, great, are not turned into iuyce, it is streter, although neither so strete, as that it onely transmitteth the thicke iuyce, since not a fewe, & that wout hurt or damage, do oft tymes, auoyde great swallowed bones.

But in diuers creatures Galen affirmeth a certaine Glandulous flesh in the inferiour Orifice of the Ventricle, sited to augment his stretenes, chiefly when the Ventricle for concoction sake, vseth the retentive facultie. But in man no Glandule circumpacteth the nether Orifice of the Ventricle, as witnesseth *Colubus Lib. 11. Cap. 4.*

The situation of the Ventricle.

1.
The figure of the Ventricle.
Why it is round.
Why the Ventricle is long.

The description of the Ventricle on both sides.

Where the Ventricle is impressed and the cause of that impression.

The Causes of the Ventricle.

The vpper Orifices of the Ventricle.

Lib. 7. v. part.
The nether Orifice of the Ventricle.

What maketh the beginning of the Intrels.

The differences betweene vpper and nether Orifices.
Why the vpper Orifices is larger then the nether.

Lib. 4. 6. part.
The glandule compasseth the nether Orifice of the Ventricle in man.

The fift Booke of the

The thicker or
swelled portion
in the Orifice of
the Ventricle.

Vesal. Loc. Cit.
The use of this
thicker portion.

Where the Ven-
tricle hath aspect
tis where not.

Colour.

Quantitie.

The action of the
Ventricle.

5.
The coats of the
Ventricle.

Why the inner
coate of the Ven-
tricle is in the
mouth harder than
in the Ventricle.

The Fibres of the
inner coate of the
Ventricle.

Loc. Cit.

The inner coate
of the Ventricle
containeth no
straight Fibres,
agayn Galen and
Vesalius.

The Ventricle
retayneth the
four naturall
Vertues.

The use of the
Fibres in the inner
coate.

The Fibres of the
second coate.

So not onely in the inferiour Orifice of the Ventricle, but also in the hypper-
most, the substance of the Ventricle is thicker, and the Orifices towardes the
interiour partes, obtaine a swelled, or moze extuberant part like a circle, wholly
answerable to the substance of the ventricle. Which in dissecting the stomach
being yet whole, is to be perceived by feeling, but being opened, and turned co-
meth to sight, manifestly shewing the beginning of the Ventricle, or end of the
stomach, and the beginning of *Duodenum*. But this thicker portion of the Ven-
tricle is chiefly made to this end, that the mouth thereof might be made moze
thicke and strong then the rest of his body, lest by force it be rushed open, or broken
of those thynges that passe downward.

But as the outer face of the Ventricle is smooth, and every where playne,
so, or rather moze is the interiour concavitie thereof, onely the aforesayd cir-
circled eminences excepted: for there the Ventricle (if it be vehemently drawne
together) sheweth nothing but wrinkles save onely a colour darke, & as it were
with cloudes varying greatly red, intermingled: being on the out side (never
thelesse) almost altogether white.

But very diuers is the quantitie of the Ventricle. For if after the maner of a
bledbar, it be blowne up, it shall not be any maruaille to thee, that at one tyme, it
can receiue such store of meates, and drinks: albeit, by the constrictiue force it
beth, whether it containe litle, or much, it doth complet the whole, so, as no
boyde space is left, but alway full as is the bledbar. To this action is the Mem-
braneous substance thereof agreeable, that fitly it might in tyme of neede dilate,
as also aptly bynd together agayne when it is requisite.

The Ventricle consisteth of two broad and thinne coates together ioyned, e-
uen as the stomach or throte, but somewhat vnlike: for the inner coate of
the Ventricle like as of the stomach, is sinewy, and Membraneous, and to the in-
ner coate of the whole stomach, mouth, lippes, and guttes continuall, though frō
the coate of the mouth and stomach a litle, onely in hardnes, differing. Which
was seemely, because we first coniect, and make ready in the mouth the rough
and hard meates, before they be committed to the Ventricle, by which, the scope
of the mouth, were not this tunicle thicke and hard, would be woꝛne, & fretted, &
therfore the coate common both to the stomach and ventricle, immediately as it
commeth to the bottome of the ventricle, is made softer.

This is with two kindes of Fibres intertexed, or entwouen. Wherein also it
varieth from the inner coate of the stomach. For the interiour part of the coate,
that respecteth the concavitie of the ventricle, is endewed with many straight Fi-
bres: for so (sayth *Vesalius*) it behoued the ventricle by them to draw, & sucke in the
meate & drinke by the stomach. Galen before him also made the like affirmation.

Nevertheless, *Columbus* herein hath not spared to confute them both, and that
to vnderstand by what reason, if thou thinke it not tedious (gentle Reader) I will
willingly employ my penne to expresse the wordes as he hath written them. Ga-
len, and after him *Vesalius* supposed that nature had constituted straight Fibres
in the inner coate of the ventricle, thereby that it might possesse the power of at-
traction, but what soeuer is eaten the stomach bringeth into it, & therfore it stode
in no neede of straight Fibres. Notwithstanding it is not destitute of the iiii. na-
turall vertues, which are also in other members, as attractiue, retentive, conco-
ctiue, and expulsiue.

But the Fibres due vnto this interiour coate of ventricle, which *Vesalius* cal-
leth the second kinde, are oblique, sited on the outside of this coate, where it is
embraced of the second: by these is purchased vnto the ventricle, the needefull
vertue of retention.

After this, as it was expediēt, expulsion of the consecret meates should follow,
like

like as after attraction, retention: so accordingly nature (put in the second, or outer tunicle of the ventricle, transuerse, or onerthwart Fibres, folded in also with some oblique for the outer coats, which is thicker and softer the the inner, beyng not so stretely compact and bound together) aboundeth with transuerse Fibres, and answereth to the second coate of the stomach, saue that it is lesse fleshy then this, and enterwoouer with some oblique Fibres also.

To these two tunicles of the ventricle hapneth an other or third, as vnto them a propugnacle, borrowed from *Peritonaeum*, where it commeth so that part of *Sep-tum* that giveth way to the stomach. Wherefore *Columbus* sayd rightly, that there are two proper coates vnto the ventricle, and one common. And this portion of *Peritonaeum* first couereth the vpper Orifice of the ventricle, and thence after the whole body therof, euen to the begynnynge of *Duodenum*, beyng of all the coates which it reacheth to other organs, the thickest, yeldyng likewise a begynnynge to the vpper Orifice of the ventricle, as hath bene sayd before.

This coate first receiveth and surmiseth, all the Veynes, Arteries, & sinewes that are reached to the ventricle. All which veynes haue their onely begynnynge from *Vena Porta*, and none or very few from *Cava*: but the Arteries all spring from those, which are scattered from the great Arterie first into the lower *Hem-bzan* of *Omentum*, and so into the liuer, vessell of coler, spleen, and finally into the ventricle deriued.

The first veyne of the ventricle begynneth from *Vena Porta*, before the same be deuised into the two great trunks, runnyng to the lower Orifice of the ventricle, being thereto at the posterioir part therof conterminat, or very neare ioyning. The Arterie associatynge this veyne is a bzaunche of *Vena Porta*, which after the way of *Vena Porta*, goeth to the hollow of the liuer.

The second veyne is euery where accompanied with an Arterie: it is stretched out to the whole halfe inferioir part of the ventricle, from which both the Anterior, and posterioir right side of the bottome of the ventricle, borroweth bzaunchyng surcles. It springeth from the right side of *Vena Porta*, where the same is deuised into the two greater trunks: the Arterie being from that deriued, which is effundeth into the liuer.

The third veyne of the ventricle is very small, not associated with any Arterie: and springyng from the left, and slender trunk of *Vena Porta*, is in the posterioir part of the ventricle, in small stoe of bzaunches, dispersed.

The fourth veyne, goyng forth from the same trunk, and euery where in his progresse purchasing the company of an Arterie, is, then all the veynes and Arteries ascendyng to the ventricle, far chiefer, and more notable, and ordered in a great number of bzaunches. From this veyne compassing about the right side of the mouth of the ventricle, a bzaunch or stocke is put forth, reachyng after the higher side of the ventricle vnto the lower Orifice thereof. But the Arterie, the mate of this present veyne, is plucked out fro that, which by the inferioir *Hem-bzan* of *Omentum*, is stretched to the spleen.

The fifth veyne, beyng not depriued of the felokshyp of an Arterie, goeth about the left side of the bottome of the ventricle, and beyng propped vp with the superioir *Hem-bzan* of *Omentum*, committeth bzaunches from his highest seate to the Anterior, and posterioir partes of the ventricle. The originall of the veyne is from the greater bzaunch of *Vena Porta*, where the same to the lower part of the spleen is to be inserted: and the Arterie his mate, from the bzaunch of the Arterie commyng to the spleen. *Galen* seemeth rather willing to call this veyne a certaine veniall passage or way, and in one place, a short vessell, whereby the spleen belcheth vp melancholye into the ventricle, as shalbe sayd hereafter.

The sixth is dedicated vnto the ventricle from those that are reached out to the spleen,

The third coate
of the Ventricle.

The vntire of
the third coate of
the Ventricle.
Whence spring
the Veynes to
the Ventricle.
Whence spring
the Arteries to
the Ventricle.

6. Veynes and Ar-
teries of the
Ventricle.

7. Veynes and Ar-
teries of the
Ventricle.

8. Veynes and Ar-
teries of the
Ventricle.

9. Veynes and Ar-
teries of the
Ventricle.

10. Veynes and Ar-
teries of the
Ventricle.

11. Veynes and Ar-
teries of the
Ventricle.

12. Veynes and Ar-
teries of the
Ventricle.

13. Veynes and Ar-
teries of the
Ventricle.

14. Veynes and Ar-
teries of the
Ventricle.

15. Veynes and Ar-
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16. Veynes and Ar-
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21. Veynes and Ar-
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22. Veynes and Ar-
teries of the
Ventricle.

23. Veynes and Ar-
teries of the
Ventricle.

24. Veynes and Ar-
teries of the
Ventricle.

25. Veynes and Ar-
teries of the
Ventricle.

The fift Booke of the

splene, and commeth to that part of the left side of the ventricle, that is neare the splene. Among which veynes that is the chiefest, which taketh his beginning from the greater branch of *Vena Porta*, inserted to the higher part of the splene: from which, small surcles like beares commonly do reach unto the upper Orifice of the ventricle. Although there be not one but many veynes, which from the splene are to the left side of the ventricle deriued. Not omitting that to the sayd veynes, coming to the left side of the ventricle, perpetually Arteries are joined in fellowship.

The office of the
veynes of the
Ventricle.

Lib. 3. cap. 13.
The way of mel-
lancoly to the
Ventricle.
The vse of melan-
coly to the Ven-
tricle according
to Fuchsius.

Collumbus confir-
meth the opinion
of Auicenn.
Lib. 1. cap. 7.
Lib. 5. cap. 9.
The vse of the
Arteries of the
Ventricle.
Of the wayes of
cooler to the Ven-
tricle.
Lib. cit. cap. 3.
Lib. cit. cap. 8.
Galen.

The nerves of
the Ventricle.

The common vse and office of all the veynes of the ventricle, is to bring thereto nourishment, as also to carry & consecret iuyce thence into the hollow of the liuer, no otherwise then the veynes of the intrels. Notwithstanding the principall office of the v. and vi. veynes, is, that by them the splene might poure forth into the ventricle melancolie iuyce, whereby (sayth *Fuchsius*) all the functions therof, which consist in a certaine kynd of embracing, are by his qualitie of fast, which is taste, & solwe, thereby of necessitie contractiue, & astringent, strenghtned: therefore neither may the meate, before it be fully consecret, please to goe forth of the ventricle.

And albeit he proueth this to be the true, and legitimate vse of the melancolie humour to the ventricle, reiecting wholly the iudgement of Auicenn, and consequently all others that speake of naturall appetite to be stirred by thereby: yet *Collumbus* since his tyme hath boldly confirmed it. I will not say how doubtfull herein the mynde of *Vesalius* hunge.

But to procede. The arteries of the ventricle serue to refresh the insited heat therof. Beside the which veynes and Arteries, no other vessel is to the ventricle implated: but if any of the wayes deducyng choler, come vnto the bottome of the ventricle, the same is most seldome sene. Wherefore *Vesalius* protesteth but onely once to haue inuented the same: and that in a man of complexion most cholericke. And *Collumbus* freely confesseth, that among all the bodyes that euer he had dissected, his eyes might neuer attayne the speciall sight therof. Galen testifieth the same in his second booke of *Temperamentes* and his viij. Chapter.

Of sinewes, not a small payze is, from the vi. conuagation of the brayne, prolonged downe to the ventricle. For after that the recurrent sinewes (in the Hypochoy of *serues* expressed) haue poured out *serues* and branches to the innolucere of the hart, and by the like also communicatyng with lunges, they immediately haste downe to the stomach, the right to the right, and the left vnto the left side: but the *serues*, so soone as they haue a litle space descended with the stomach, committed onely thereto by the interuenture of Fibres, they both are denuded in two and the right with oblique branches is caried to the left side as the left vnto the right: both which, accompanying the stomach, pearse through the intestines, not offryng thereto any branch at all. But where the iij. branches of the two *serues* do touch the upper Orifice of the ventricle, with diuers orders of branching they embrace it, reachyng straight downward surcles, with notable space betwene.

From the left *serue* of the vi. payze embracing the right region of the mouth of the ventricle, a certaine notable branch, after the higher side of the ventricle euen to the lower Orifice thereof, is deduced: which albeit that in the progresse therof it poureth out portions, and enuappeth the nether Orifice of the ventricle with some surcles, yet is it not there wholly wasted, untill further it haue crept into the hollow of the liuer.

But moreover, vnto the lower part of the ventricle commeth two *serues*, purchasing their beginninges from the stockes of the sixt payze of sinewes of the brayne, brought downe after the routes of the ribbes: and beynge the mates of those Arteries, supported by the superiour Membran of *Omentum*, are digested into

into the bottome of the ventricle.

Amongest all whiche sundry portions of sinewes that the ventricle stode in nede of, nature by none shewed such noble prouidence, as in those to the superior Office therof inserted: which are not there in such manifold manner scattered onely to discerne annonaunce, at any tyme offered thereto by cholericke humors, or other of that kynde, but likewise that by them, as by riuer, the animall force might be thereto dispensed, making the stomach to feele the needefulnes of meate and drinke: and so consequently styrring it to receiue fode, the same Galen sheweth in his fourth booke of the vse of partes.

The Ventricle round about (as great fires to the cauldron) is compassed with heatyng organs, well ayding his concoctiue force. For the liuer completeth his whole superiour region towards the anteriour partes, and his right side, and the right Gibbous part in the posteriour seate. But the higher part therof, consisting to the posteriour seate of the upper Office, and all the whole left side therof, is compassed with the midriff, onely that side excepted, with the spleen on the left side of the ventricle, and lower posteriour part therof, occupieth. But in his hinder part the ventricle obtaineth the inferiour Membran of *Omentum*, and the vessels which therein are diffused.

Beside that, vnder his posteriour part, a part of the midriff, *Vena Cava*, and the trunk of the great Arterie, beside the backe, and Muscles therof, do consist. But there is notwithstanding a great part of the Anteriour region of the ventricle, which couered neither with the liuer, midriff, kelle, nor spleen, obtaineth here an other succour, in heatyng nothyng inferiour to the kelle. For beside *Peritonaeum*, and the big Muscles of Abdomen, there is a veyne from the nauell led vnto the liuer, whereby the child receiveth nourishment within the wombe, and which after tyme of byrth becommeth without blood, and vse.

To this veyne, where beyng knit to *Peritonaeum*, it is layd ouer the ventricle in round circuit, much fat springeth, which, that the ventricle in his concoctiue office might moze swiftly labour, yeldeth there some helpe.

Neither is the ventricle as some haue fondly supposed, nourished by *Chylus*, which it engendzeth, since by the benefite of those faculties, whiche it obtaineth common with the other partes, it draweth to it selfe out of the veynes, and retaineth and labourerth proper nourishment, thrusting out from it selfe what soeuer is superfluous. This also testifieth *Columbus*, saying no part of the body is nourished but by blood.

Finally by the giftes, by which the ventricle ministrerth vnto the whole body, and for which, some call it the kyng of the body, it receiveth meate, and drinke, by straight Fibres in at the stomach from the mouth, which immediately taken, is retained by oblique Fibres, and all a while embraced, vntill, by engendryng in it selfe the alteratiue facultie, it haue conuerted the same into a thicke creame, or iuyce, in colour answerable to his owne substance: and at length, endeavouring to put forth into the intrels that which it hath confected, it openeth the lower Office, and then by transuerse Fibres that which it embraced, thrusteth downward. Some tyme it vomitteth: but that motion is violent, and agaynst nature: for then the oblique, together with the transuerse Fibres do driue out, with great endeavour, and the straight Fibres of the stomach moue in opposite order to natures first decree.

As sithens the guttes are to this ventricle continuall, it seemeth, immediately to prosecute their description, a thyng of right required. Which as they take their begynnynge from the ventricle, so seeme they also one substance therewith, although a litle thinner. They are situated from the inferiour Office of the ventricle euen downe to the fundament, and occupy the greater of Abdo-

men.

The vse of the
Arteries of the
Ventricle.

Galen.

How is it situated
by the Ventricle
is situated, and
how it is assisted
by the partes cir-
cumiacent.

The Umbelical
veine.

The Ventricle
is not nourished
by Chylus.

Lib. 1. cap. 4.

Vesal. Li. cit. cap. 3.
The operation of
the Ventricle.
Retention.
Retayning.

Expelleth.

Col. Loc. cit.
Domerting.

Of the Intrels
or guttes.
Col. Lib. cit. cap. 5.

Situation.

The fift Booke of the

Substance.

Vesal. Li. Cit. cap. 5.

The coates of the Intrels.

In Dysenteria the inner coate of the Intrelles may putrifie and the party line.

Lib. 4. vi. partium.

Vesal. Loc. Cit.

Why the inner coate in dysenteria is softer then the same in the Ventricle.

Why the inner coate of the great guttes is harder then of the small.

Fibres to the Intrels.

Why to the straight gutte and Colon are somme straight Fibres.

The third coate to the intrels.

Where first the vesselles come to the intrels.

The figure of the intrels.

Of the vessells to the guttes.

Why to the small guttes are more, to the greater fewer.

The vse of nerves to the guttes.

The diuision of the intrels.

Columbus would diuide them into 11.

men. Their substance is Membraneous, yet not every where alike in thickness. But such notwithstanding, as easily might embrace that which it containeth, and agayne apte to be distended, or retched out by the thynges contained.

They haue two peculiar coates, and one, which they purchase from *Peritonaeum*, to make them lesse subiect to iniurious offence. Wherfore Galen affirmeth that the interior, by *Dysenteria* or other dayly griefes, sometyne putrifieth, yet the outer being safe, some so affected do escape. The interior coate of the guttes is softer then the interior coate of the ventricle, for that they receiue no rough or vnbroken thynges as doth the ventricle: but their outer coate is more thinn, and fleshy, yet lesse fleshy then the inner coate of the ventricle: because they are rather the instrumentes of distribution then of concoction. The inner coate of the great guttes is so much harder then the interior coate of the small, by how much they containe matter more hard and boyde of iuyce. For that which is contained in the small guttes is liquid, flowyng, and watrish: whereas that in the great guttes is hard.

Both the coates of the intestines haue orbicular Fibres, that they might byne forth that which floweth into them more speedely: and there the whole iuyce is speedely sucked to the liuer. But the outer coate of the straight intestine, and of Colon, obtaineth straight Fibres: whiche are made as a band to the circular Fibres, lest happely they sometyne, in forcing out the hard excrementes, might also together with them depart, and be plucked away. And for this cause chiefly so many of that kynde are bestowed on the straight gut, for that it amyleteth the dryer excrementes.

The third coate of the intestines is as a propugnacle to the second, by whose benefite, and interuenture of *Mesenterium*, the intrels are bounde to the backe. This is taken from the Membrans of *Peritonaeum* securely carieng the vessells to the intestines. For these Membrans, together with the vesselles conmyng to the hollow seate of the intrels, are dilated, there endowyng them with a third coate. By the hollow side of the guttes is ment the part which the vessell first touch, and by the Gibbous part, the contrary.

They are created round in fourme, to be the more capacious, and lesse subiect to iniuries. But veynes and Arteries are not in like number giuen to every one, like as not in all the intrels is equall store of iuyce to be sucked out. For by how much the intrelles in continuitie are nearer the ventricle, by somuch they containe more of the best iuyce: therfore consequently, greater store of vesselles are to the small guttes distributed, and fewer to the great.

So are the guttes endewed with sinewes, that they might giue knowledge of every hurtfull hūger. For, if they were altogether boyde of sense, nothyng might resist, but that the guttes, either by yellow Choler, or other biting humour, might thoghly be corrected before a man should feele.

Howeuer although the intrels be one continuall body, notwithstanding, when they are circinduced into diuers, and many enfoldes, and turnynges, and those differing in figure: neither chuse they in all places the same nature in situation, substance, and fourme. And agayne others are made touchyng some peculiar part in man: nether the principall vse of them all alike. The learned Anathomistes, and such as haue bene in dissection expert, do number them as though they were more. And first they deuide them into small, & great: then either of them agayne into three, so that all are in number vi. constituted (although Columbus if it were lawfull to starte from the elders, could contentedly stand to the first diuision) that is to say *Duodenum*, *Ieiunum*, *Tenu*, *Cæcum*, *Colum*, and *Rectum*. All which in order we will speake by, so soone as we haue vnfolded the peculiar properties of the first diuision, that is, the office of the small and great guttes.

The

The small guttes (as witnesseth *Gal. Lib. 4. vs. Partium*) are chiefly fourmed, that by their benefite, what soeuer iuyce is of the meate laboured by the diligence of the vetricle, the same might be drawne into the liuer, the Shoppe or storehouse of blood. As also that the dregges, and such thynges as are vnapt to be drawne, might be duly excerned or auoyded. Last of all, to the concoctiue and alteratiue force the small guttes are somewhat assistant: as that the substance first concocted of the vetricle, they might a litle more absolutely chaunge. Neither is it to be denyed, that the meate, in the passage therof through the intrels, is more concocted, like as also in the veynes the blood, and in the hart the vitall spirite: which (sayth *Collumbus*) is engendred by the labour of the lunges in the veniall Arteris, but after made perfect in the hart, as in *h* History of the spirituall partes is sufficiently touched. Wherefore, euen as Nature hath giuen vnto the veynes (which she framed for instrumentes of distribution) of the generatiue facultie of blood, euen so, and by the same reason, to the small intrels, made for distribution therof into *h* veynes, a certaine concoctiue facultie of meates is toynded, wrynded, and turned with many foldes & turnynges, hath nature all the scope of the small guttes: to the end, that if any nourishment in the passage of the first anfract or turnyng do escape the mouthes of the vessels, to the inside of the intrels opening, it might chaunce into the second: but if it did passe that also, yet followeth the thyrde, fourth, fift, and others a great number. Wherefore for the streit and long passages, with so many turnes and foldyngs, euery part of the meate is at length constrained to appropinquate the mouth of some one, or other of the vessels. Cū as the whole gutte euery where round about, is replenished with an innumerable multitude of vessels: whose Orifices penetrate into the capacite of the intrels, after the maner as shortly shalbe said. Of the which vessels is catched, what soeuer is profitable of the nourishment that passeth by. So as it cannot be, that any iuyce fit for the nourishment of the body, may slippe from the same vnprofitable. The foldes and turnynges therefore of the guttes, are to that end made, to yeld exact distribution of all the concocted nourishment, lest the same swiftly passyng away, and so goyng out, the body should be diuened into an vrgent necessitie of receiuyng nourishment: whereby men should lead their liues in continuall needfulness of belly chere. As for exāple. The creatures in which none of those foldes or turnyng, spoken of, are founde, but haue one simple intrell, or gutte from the vetricle to the fundament straight pretensed, we see to be rauenous, vnassatiab, and such as liue in perpetuall desire of eatyng. Not improuident by them did nature in mans body worke her effect in the intrels, with such anfractuons foldes as are euident, that they might delay, and a while reteine the iuyce which floweth from the vetricle, vntill the meseraicall veynes haue sucked in all that is commodious, and caried it to the liuer.

1.
The vse of the small guttes.

The small guttes ayde & concoctiue and alteratiue force.

The blood is in the veynes perfected.
Lib. 7.

The vse of the foldes and compasses of the guttes.

Why man is so temperate in the hyng of substance.

Why some creatures are vnassatiab in eatyng.

How the iuyce is caried to *h* liuer.

2.
The vse of the great guttes.

3.
The first parte called Duodenum. Situation.
Lib. 3. cap. 3.

But the great guttes, although they be also to the distribution of the iuyces conuenient, notwithstanding particularly, because great is their amplitude or scope, and therefore able to gather together and conteine many thynges, to the end that not immediately, but by long space of tyme we vse egestio. Also if any thyng shall escape this suckyng in the small guttes, the same whilest with longer delay the excrementes tary in the great, is baled forth by their vessels. But to speake of these particularly, that is to say of the singular partes and dimissions.

First all that part of the gutte, which vnder the vetricle from the inferiour Orifice therof, straight (after a certaine maner) descendeth thither, whereas the gutte first begynneth to be infolded, because in man for the most part it holdeth the length of ry. fingers, is called of the Grekes Δωδεκαδακτυλος, and of the Latins *Duodenum*. There are (sayth *Vesalius*) which thinke not good to call this a gutte, but rather a rising, begynnynge, or a Processe of the intrels. This portion

The fift Booke of the

Why Duodenum
hath no foldes.

Galen.

Pyloron.
Duodenum is the
beginning of the
guttas and not
Pyloron.
Lib. 3. Cap. 5.
Li. 1. Paradox. ca. 1.
De uisc. Arterie.

Vesalius.

Nerues.

The benefite of
coler to Duodenum.

Fuchsius.

Cap. 5.

Tho. Linare.

Col. Lib. 11. cap. 5.
The progresse of
Duodenum.

Vesal. Loc. cit.
The vse of the
glandule vnder
Duodenum.

2.
The second por-
tion of guttes.
Jejunum.
Why it is called
the hunger gutte.
What maketh it
euer empty.

Columbus affir-
meth the way of
coler to come vnto
Jejunum.
Loc. Cit.

part *Duodenum* is led into no anfractuious foldes, as before of others is sayd, for asmuch as vnder the ventricule where it is caried, it obtaineth no spare place, nor vacant roome in which it might aptly bowe, and infold it selfe. As also that it behoued it to giue place to *Vena porta* commyng from the hollow of the liuer, as Galen copiously mentioneth in his iij. booke of the vtilitie of partes.

The originall therof is therfore from the inferior Office of the ventricule, called *Pyloron*, and in diuers from the same. Wherfore to this purpose, Galen sayth in his fourth of the vse of partes. That *Duodenum* is the beginning of the guttes is not part of the ventricule, but some other part connect and knit thereto.

Fuchsius therfore sayth, that they are much deceiued, which iudge no difference betwene *Duodenum* and *Pyloron*. *Duodenum* hath a veyne and an Arterie peculiar to it selfe, and which is caried directly downward after the longitude therof.

This veyne purchaseth his estate from *Vena porta* before it be inserted in *Mesenterium*. But the Arterie proceedeth from that, which is offered to the liuer. Serues such as it hath, it receiueth from those, which come to the lower Office of the ventricule, and to the right side of the bottome therof.

Beside, the intrell *Duodenum* chalengeth that vnto it selfe, that the way of passage carieng yellow coler to the guttes, is implanted to it, that is to say, by the infuse of coler stimulatyng and styrring by the force of the guttes, to helpe their action vehemently, and to the expulsiue of flegme within them insident.

But notwithstandyng, that thus *Vesalius* describeth a peculiar property to *Duodenum*, that is, the access of yellow coler vnto it, whereto *Fuchsius* not onely subscribeth, but also sayth farther that they are farre deceiued, that affirme this passage of coler to be inserted to any other of the guttes, alledgyng further, with many wordes in the vij. Chapter of his third booke, that whereas the occasion of this errorr seemeth to be take out of *Gal. Lib. 13. Therap. method. cap. 13*. It happeneth rather through imbecillitie of his interpretour *Tho. Linacre*, not perfectly vnderstandyng the sense or meanyng of that place. But howsoever himselfe vnderstande of that place, I will leaue to the learned to discusse. Onely this I say, that I say, that all are not agreed vpon this poynt that *Vesalius*, and he haue set downe without doubtyng, as more properly we may declare in describyng the next gutte.

The progresse of this portion *Duodenum* is thus, after the exerture therof from the ventricule, it descendeth towardes the Spine, whence agayne after ward it riseth, and giueth a beginning to the foldes or turnynges of the guttes, there endyng. So vnder it is layd a certayne Glandulous body to support, and shield the vessels proper to the same gutte, as also to irrigate, and moisten the amplitude, or scope of the same gutte with a certayne gentle humour: but because this intrell alone doth not receiue the rehearsed vtilitie, but in like maner also the other intrels: I will deferre their speciall explication till I take in hand to speake of *Mesenterium*.

Now the second intestine there begynneth, where is made the first conuolution or enfold. The Grecians call it *εντεριον*, the Latins *Jejunum*; and that because from tyme to tyme in dissection, in comparison of the other guttes, it is founde voyde, and empty. For the iuyce that it receiueth, it transmitteth most swiftly: for that choler not mixed with the iuyce sloweth to the side of the intrell, styrring by his sharpnes the vertue therof, to the immediate or speedy propulsiue of that therein conteyned.

But then me thinke if it should but flow vnto the side of this, from the abundance of that which *Duodenum* hath, the chief effect therof should be more sene in *Duodenum* then in this, that is, *Jejunum* should neuer be found so empty as it, whereas alway this beareth the name of emptines aboue any other. And *Realdus*

Col-

Columbus writeth playnly, in telling wherfore it is called *Ieiunum*, or as we may terme it the hungry gutte, which happeneth (sayth he) because the iuyce comyng hither is as yet thinne, and slowyng. Furthermore for the cause of the way of the vessel of choler, which endeth at the begynnyng of this same gutte: without any mention of comyng to *Duodenum*. Also *Iho. Fernelius* sayth it auoydeth speedely fro it, by the sharpenes of choler, that floweth into it. So that it may reasonably be gathered, if choler wozke his most special effect in this, that then his principall prospect is thereunto.

This gutte *Ieiunum* is situated iust in the midst of the bellye, beyng there next vnto the centre of *Mesenterium*, to the end that the armes or bzaunches of *Vena porta*, and the great Arterie, might with a shorter journey be poured out vpon it. But that *Rhazes*, *Mundinus*, *Alexander*, *Benedictus* and such others, that supposed this intrell to be no more turned or folded then the last of all called *Rectum*, were greatly ouertaken with errour, there is no man that knoweth not.

Ieiunum hath his veynes and Arteries in copious sort, from those which are reached forth to *Mesenterium*, from *Vena porta*, and from the roote of the Arterie, that fro the great Arterie taketh his begynnyng aboue the Arteries of the reynes. For few bzaunches are diffused among the smaller guttes, from the arme of the Arterie, which begynneth from the great Arteries, after the goyng forth of the seminall Arteries. Neither are the vessels, as in *Duodenum* led after the length of *Ieiunum* vnder it, but as out of the centre of *Mesenterium* from beneath stretch by ward, and straight forthward into it, beyng thereunto with sundry sortes of bzaunchyngs, like the roote of trees, especially into the hollow part therof, implanted, openyng their mouthes into the inside of the gutte. Sinelues likewise obtaineth this hungry intrell deriued from the bzaunches of the vi. payre of the brayne, which are extended to the rootes of the ribbes. For from them two bzaunches, on eche side, are sent to *Mesenterium*, and thence agayne into many partes broken, and deliuered to the intrels.

The third intestine succedeyng *Ieiunum* is called *Ileon*, of some *Tenne*, or *Gracile*, but most commonly *Ileon*, for the many foldes thereof or *Vesalius* and *Columbus* do testifie. It occupieth the midst of the bellye as *Ieiunum* for the same causes, and endeth at the begynnyng of the great gutte. But where *Ileon* begynneth it is no playne matter to expresse. For fro the begynnyng of *Ieiunum* downe vnto the end of *Ileon*, is found no manifest matter, wherby to distinguish the end of the one and begynnyng of the other. For (sayth *Columbus*) they both be of one substance, and colour. And no otherwise he can search the difference betwene them, then that the miserable beynes are more plentyfull, and great in *Ieiunum* then in *Ileon*. These three intrels hitherto spoken of, are the small guttes, the other three that folloiw, the great: that is to say *Cacum*, *Colon*, and *Rectum*.

The fourth gutte therfore beyng the first of the great, is called by the auncient professors of *Anatomie* *Cacum*, that is the blynd gutte, because it is endewd with one onely mouth. Hence it cometh that *Anicen*, and some other later professors haue named it *Orbus*, or *Monoculus*. And they are farre deceiued, which not yeldyng to the auncient *Grækes*, doe deuise two holes or *Orifices* therein, when as these two *Orifices*, which they imagine, are not in the sayd gutte called *Cacum*, but in the extuberant begynnyng of *Colon*. For this in his left side hath ij. *Orifices*: wherof the one higher is continuall with the small gutte, but the other lower is called the begynnyng of *Cacum*.

Wherfore this *Cacum* in mā is shorter then all other intrels, and much more narrow, and strete, then the narrowest part of all the other intrels, and like a thicke wozme wound in foldes rather then a gutte: so that it seemeth scarce woz to be accounted in the place of an Appendance of the guttes, much lesse ther-

E.i.

foze

Lib. 1. Cap. 7.

Vesalius.
The situation of
Ieiunum.The courser of
Duets.

Veins and Arteries.

How the vessels
come vnto *Ieiunum*.

Nerves.

The third portion
Ileon.
Locis citat.
Situation.How the end of
Ieiunum from the
beginning of *Ileon*
is distinguished.

The final guttes.

Vesal. Fuch.
Why the fourth
portion is called
Cacum.16. 3. tract. 1. Cap. 1.
In *Cacum* are
not ij. holes as
some haue deuised.
Colon in his left
side hath ij. *Orifices*.*Cacum* is the
shortest part of
the guttes.
Figure.

The fift Booke of the

A Fichio citatus.

How truly
this gutte is cal-
led a sacke.

In what crea-
tures Cæcum is
large.

Situation.

Wherein Cæcum
is compared to the blind
gutte in other
creatures.
What Vesalius
vnderstand by
Cæcum and what
Columbus.

Lib. 1. cap. 7.
Where first the
dregges begin.

Iulio Poll. teste.
Why the 1. por-
tion is called Colo.

Vesalius.
The beginning
and progresse of
Colon.

The cause of er-
rour in Mundinus
and others.

Columbus.
Mundinus his
errour surmise.

Gal. Loc. aff. Lib. 2.
How the ventricle
is offended by
consent of Colon.
Vesalius.

Columbus.

How it cometh
that payne in
Colon may seme
to be in Reines
and contrariwise.

foze in the number of the thicke intrels. And Iulius Pollux in his second booke, ac-
compteth it rather and moze rightly an Appendaunce then a gutte. Farre wyde
therfoze they do stray, which affi me this blynd gutte to be as a certaine large
and thicke belly, mate for the receipt of excrementes, and for that cause giue it
the name of a sacke. But from the vbled authoritie of Galen, he yng ignorant that
him selfe was deluded by Apes.

In dogges also this blynd gutte is much moze ample and large then in men,
but in squirrelles and doyme mice, it is answerable to the amplitude of their ven-
tricle, and in dissection founde swelled out with dregges. And for that cause in
such creatures rightly, it may purchase the name of a sacke, but in man other-
wise: in whom that small portion of intrell and Appendaunce, not annexed to
Mesenterium, but in it selfe folded, and cleaupng by the benefite of Fibres, is *Cæ-
cum Intestinum*, because that in order, situation, and fourme, though not in large-
nes, it agré with the blynd gutte of the aforesayd creatures, and hath one Office,
whence (as is sayd) it first toke the name of *Cæcum*. But Vesalius opinion is su-
spectred by Columbus, in that he is thought to haue giuen the name of *Cæcum* to
this gutte for the Appendaunce sake: whereas he supposeth rather the elders
to haue vnderstand by the name of *Cæcum Intestinum*, what soeuer is stretched frō
the insertion of the small guttes vnto *Colon*. The which space (sayth he) in Dren,
swine, doyme mice, and squirrels is very notable.

Of this (sayth Fernelius) the dregges, and refuse in the belly haue their first
kynde and name. For from the iuyces, whilst they are caried through the small
guttes, is sucked and chosen all the most pure and vtile substance, the remnaunt
are superfluous dregges: by which name they are first nominated, when as they
come to this *Cæcum Intestinum*.

The fift portion is called *Colon a torquendo*, that is to say of writhyng, for that
most mighty paynes do consist therein, when as by flegme or grosse spirite, it is
obstruct, and stopped.

In the right side of *Ilion*, at the lower part of the right kidney, as a certaine
great gloke swelling out, is that large and round beginnyng of *Colon*, which from
thence by litle and litle straight stretcheth byward to the liuer, where, beyng
strewed somewhat vnder the hollow therof, it toucheth the bledbar of coler, with
which touchyng it is sometyme dyed: which perhaps was the cause of errour in
Mundinus and others, supposyng therfoze the way of coler had bene transposed to
the intestine *Colon*. From the vessicle of coler it is brought forth of the right side,
after the inferiour region of the ventricle, and stretched vnder the bottome of the same
ouerthwartly to Abdomen, but not about the ventricle as *Mundinus* dreamed:
who craftely had surmised, that therfoze concoction in the ventricle was hereby
assisted, whilst the excrementes in this gutte were detained. Where it cometh that
herein a hurtfull humour holden, catcheth likewise the ventricle by consent, wher-
by both appetite and concoction becommeth the worse. And somewhiles in dede
it so affecteth the ventricle, as that the patient oft falleth into defect of mynde
whilst he endeouureth to vnload his belly. This agayne, after it hath touched
the left side of the ventricle, it lightly obtaineth about the lower part of the splene
certaine foldes, or inflexures, and so by litle and litle cometh vpon the left kid-
ney crookedly, whereto it is bound. Forthwith besides inflected, it descendeth, and
in comyng to the left side of *Ilion* maketh two compasses, at length finishyng
his course at *Rectum Intestinum* in the toppe of *Os sacrum*. Hence also it com-
meth that by the vicinity or (moze then that) the tyng of *Colon* to the kidney,
Whistleds are sometymes deceiued, imaginyn the payne that is in *Colon* to be in
the reynes, and agayne that which is in the reynes to be in *Colon*, as plentifully
Galen teacheth in his 6. de affect. loc. ca. 2.

But

But to the end that the right, or greater trunk of *Vena porta* might be seated in the small guttes with shorter journey, and to transerre the meate to the liner by more abridged way: this intestine (*Colon*) giveth place to the small guttes, and proceedeth as it were by distanced places much from the centre of *Mesenterium*. For whiche cause, the principall portion thereof occupieth the left side of the body.

Howeuer this gutte in men is farre otherwise then in dogges, it is not exactly round, but all after the length thereof depressed aboue, and beneath, and on each side effourmyng a certaine rowe (as it were) of globes, and celles.

The *Colon* in his whole progresse, from the right side of *Ilium* almost to the left kidney, beyndes and Arteries, like as to *Ieiunum* and *Ilium*, are implanted: that is to say, from beneath rising by companies upward: and to the inferior part thereof from the right kidney, euen unto the straight gutte beyndes, and Arteries, like as to *Duodenum*, are reached. And serues both *Colon*, and the other great guttes haue, with the small intestines common. Finally when nature had deuised this fist portion of sufficient largenes and scope, she prepared for the same two Ligamentes like y, gyddes, of which she did the one higher, the other lower.

The first, last, and lowest portion of the guttes is called *Longum* or *Rectum*. It is called straight, for that it is not wynded or turned about in foldes. All of the great gutte, that descendeth from the beginning of *Oesophagus*, downe to the fundament or seat, in men vnder the bleedar, in women vnder the matrice, is comprehended vnder the name of *Rectum Intestinum*, in English the straight gutte. It hath beyndes and Arteries from the branches of *Porta*, and the great Arterie: and of serues chalengeth his part among those, that are common to the other intrels.

But before I cleane breake of this description of the guttes note (diligent Reader for so *Columbus* willet) the notable deuise of nature, who in placing the intrels, first made of the great guttes as it were a certaine balley, and then slightly seated therein the small: the more easely to shunne all extreme injuries.

The body named *Mesenterium*, or *Mesaraon*, purchaseth both those names by accidentes. As first for the situation thereof, because it is sited in the middell betwene the intrels, and therefore complecteth them as a band. But it is named *Mesaraon* for his proper substance, containing all the beyndes descending from the liner into it, together with the nighe Arteries & Serues: where those beyndes happen to be called *Mesaraica*, or *Mesaraea*.

Therefore in the hynder part of the guttes is placed this band: by whose benefite it might come to passe, that the intrels be bound together to the backe. It riseth from the Spine, and is begotten of two Membrans from *Peritoneum*, or is (as *Columbus* briefly speaketh) a doubling agayne of *Peritoneum*, betwene which reduplication the aforesayd vessels runne. Notwithstanding the originall of those Membrans is not from one and the same seat of *Peritoneum*, but diuers, according to the forme of the same *Mesenterium*, which the guttes almost do make, being therewith bound together. For as the maner of euery inflexure of the guttes is not alike: so neither euery where alike shape of *Mesenterium*. Which Galen as it seemeth diligently noted *Lib. de Ven. dissect.* For although in deede *Mesenterium* be euery where one continual, he neuertheless hath recited there as one the right, an other the left, and the third the middell.

It appeareth that he calleth the middell that part of *Mesenterium*, whiche gathereth *Ieiunum* and *Ilium* to the backe: which springing with a narrow beginning, is brought forth into a varueilous amplitude and breadth, that it might grow to all the inflexures of *Ieiunum* and *Ilium*.

The right and left he might name, where it byndeth *Colon* and *Rectum* to the backe. The right in the region of the right *Ilium*, and left placed in the left. The

E.g.

part

Vesalius.
How Colon giveth place to the small guttes and why.

The forme of Colon.
Vesalius.
De vitiis Colonicis.

Nerves.

Columbus.
The 4. Ligamentes that hold Colon.

Vesalius.
The 4. portion of the guttes called Longum.
Situation.
De vitiis.
Nerves.

Columbus.
The notable deuise of nature in placing guttes in the belly.

10.
Vesalius, cap. 6.
Testante Gal. de anat. admi. lib. 7.
Mesenterium and why it is so named.

What the beyndes in Mesaraon are called.
Situation.

The originall of Mesenterium.
Cap. 6.
Vesalius.
Source.

Division of Mesenterium.

Which is the middell.

Which is the right and left side.

The fift Booke of the

How that part of Mesenterium is begotten that supporteth the small guttes to the backe.

Whence springeth the part knitting Colon and Rectum to the backe.

Why Mesenterium is of such substance.

How the trunkes of Vena Porta entereth into Mesenterium. Whence the vessels come.

The distribution of the vessels to the guttes.

Fatnes in Mesenterium.

Pancreas. The office of Pancreas.

Situation.

The vse of all the Glandules to the guttes.

How the third coate is made to the guttes. The vse of the third coate.

part therfore of *Mesenterium* peculiar to the small guttes, chuseth in all respect the lyke begynnynge as doth the inferiour *Membran* of *Omentum*. For from the coates of the great Arterie and hollow beyne, whiche the same vessels in their whole progresse, after the Vertebres of the loynes, obtaine from *Peritonaeum*, Membranous Fibres in great number arise, immediately degeneratynge into *Membrans*, the right into a right, and the left into a left. By these *Membrans* mutually knit together, that part of *Mesenterium* is effourmed that byndeth the small guttes to the backe. But the partes connedynge *Colon* and *Rectum* together to the backe, spring from those regions of *Peritonaeum* after whiche these intrels are reached, *Peritonaeum* alway sendynge forth certaine Fibres thither, whiche do degenerate into *Membrans*.

Neither is the substance of *Mesenterium*, onely that it might bynd the intrels more strongly to the backe, made Membranous, but also for a certaine other great vse, that it might safely gather together, and shield the secure course of beynes from *Porta*, and Arteries from *Magna*, ramifying in *Membrans*, so that neither whilst a man leapeth, or falleth they are cotused or broken. For the greater trunkes of *Vena porta*, whereas *Mesenterium* about the region of the reynes springeth from the backe, is led betwene the two *Membrans* therof, associated with an Arterie, which fetcheth his begynnynge from the great Arterie, before the same disperse his branches unto the reynes, to the end it might be poured out into the intrels. Whether also are extended two *Nerves*, on eche side one, made cut from those branches, whiche from the *VI. par* of the *brayne* are reached out to the rootes of the ribbes. So that the same great trunkes of *Vena porta*, and the sayd Arterie, together with the two *Nerves* do go vnder the centre of *Mesenterium*, making entrance betwene the *Membrans* therof, which mutually cleave together: and afterwarde, straying throughout all the region of *Mesenterium*, insert them selues to the intrels by innumerable branches. But beside this rehearsed Arterie, there is an other certaine stocke derived from the great Arterie, which entereth into that part of *Mesenterium*, that vnder the region of the beynes begynneth from the backe. And the exorture of this stocke is taken from the great Arterie, a litle vnder the begynnynge of the seminall Arteries.

Furthermore, even as man euery where aboundeth with copious fatnes, so likewise in *Mesenterium* the plenty therof is spyed, by blond there sweatyng out of the vessels, and after conuerted into fat by the nature of the *Membrans*. So that beside the sinewes, and vessels, the *Membrans* of *Omentum* containe likewise much fatnes betwene them.

But beyond all fatnes there is an other thyng by nature added to *Mesenterium*, that is a Glandulous body called in *Greekes* *Pancreas* heretofore spoken of: so subserued, and circumposed to the singular scissions of the vessels euery where, as that none of them by any mouyng may be dissolved or broken.

And therfore at the centre of *Mesenterium*, where of the vessels the first distribution is made, nature hath layd this Glandulous body, with all securitie to lead, & conduct the first derivations most notable branches of the vessels. To the rest of *Mesenterium*, for euery branche she hath given some Glandule, as a firmament of the same diuision, neuer omittynge their officiall duety in mopenyng the guttes. So that together with the beneficiall helpe of those Glandules, the *Membrans* of *Mesenterium* most safely lead the vessels towarde the intestines, with no lesse vtilitie byndynge the guttes to the backe, and at length formally fashionynge a third coate vnto them all. As when the *Membrans* of *Mesenterium* deduce the vessels to the hollow part of the guttes, together with the vessels, they growe vnto them, but thence either of them mutually departynge crape ouer by the sides of the guttes, and degenerate into a third tunicle: by this occasion, both

byn.

bynding them more strongly, as also for the vessels, constituting the safer propugnacle.

The next, and most notable neighbour unto the ventricle is the liver, the repository of all concupiscible facultie: whom no man (for his vicinitie) may deny to be greatly assistant unto the same, though his warme complexion, and situation with the naturall nourishment of the blood, wherof who can disproue it the fountaine, although Aristotle would sayne haue proued the begynnyng of blood to be in the hart.

Wherfore this beyng one of the principall partes in the body, leaueth vs to note how that it is first also engendred about other members in the body. For when the Umbellicall beyne is first engendred, thereto also first cleaueth and encreaseth the liver, the first instrument of the generation of blood.

It is collocated immediately vnder the midriff, occupieng the greatest part of his inferiour seate, but in the right side of Abdomen, vnder the false ribbes: in which place it is fastened with two Ligamentes, of whiche the one is about the hollow beyne, the other is called a Suspensorie of a certaine diuision, wherein the Umbellicall beyne is inserted. These therfore do fasten the liver vnto *Septum transversum*. And although it be situate in the right side as is sayd, yet neuertheless it occupieth a great part likewise of the left side, whereas by the helpe of a strong Ligament, it is connected and knit to *Diaphragma*.

It is not in figure exactly round, and in man is a whole substance, not deuided into lobes as Galen verely supposed, although of that maner it be to be found in foure footed creatures. And the cause why in vs it is whole, and in them deuided, *Collumbus* doth in this maner discusse, that man being of direct & straight figure, fourmed by the hand of the omnipotent, with the hollow part of the liver couereth next, and immediately the ventricle which coueryng from the right to the left side, occupieth the whole Anterior region, & maketh that the ventricle suffreth no cold. Wherfore it is easily imagined, how finally awayllable are & vnguetes, which some men minister vpon the sharpe Griskell, to amend the cold intemperature of the ventricles, whilst they increase but the heate of the liver vnder lying, and befoze boate of nature.

But againe to & purpose. The liver of foure footed beastes is deuided into many lobes, the apter to enclasp the ventricle as with the fingers of ones hand: which, if it should be whole, and they goyng prone vpon the earth, might by no means be brought to passe. But in byrdes for that they rather stand vpright, then go prone vpon the earth, it is onely into two partes separated. Wherfore in man no where deuided at all, but in the Anterior part, and out side of the liver. Whiche was necessary there to be deuided for the admission of the umbellicall beyne. Vnder this also, where *Vena porta* goeth out, are two small eminences, necessary for the defence therof, lest the beyne, by the body of the Vertebres at any tyme, should be compressed. But neuertheless these eminences are neither to be called Lobes, Fibres, nor wynges.

The liver hauing two partes the one exterior, and the other interior, hath the outer Gibbous or bossed forth, and smooth, but the other hollow, and rough like water bankes. And that because that vnderneath it is placed the round bunched ventricle. It is circundated, and enuwrapped with a thynne Membran of *Peritonaeum*, wherfore the extremities therof are not voyde of feelyng.

It is in substance nothing els but a heape of crudded blood, intertered with many beynes, and some Arteries, and is a great member, the prince of Abdomen. Wherein some haue supposed naturall spirites to be engendred, but that sentence is not allowed: for, to be the fountaine of blood (as is aforesayd) nature dedicated his office. Neither do I suppose that any man in these dayes doubteth

E. ij.

The liver the seat of concupiscible facultie.

The liver is the fountaine of blood and ayde to the ventricle.

Gal. Lib. 4. vi. part.

Col. Lib. 6. de Iecore et vena.

The liver is first engendred and how.

Vesal. Lib. 3. cap. 7. Situation.

Col. libid. Two Ligamentes of the liver.

Figure.

Why mans liver is not deuided into lobes as in beastes. Ibidem.

Topic medicinae are easily applied vpon the sharpe cartilage.

Why the liver in foure footed creatures is deuided into lobes.

The liver in birdes is deuided into 4 partes. Why the liver of man hath that onely diuision. Two eminences vnder Vena cava.

The coats that inueth & liue & giue it sense.

The substance of the liver.

Natural spirites are not begotten in the liver.

it

The fift Booke of the

The originall of
Vena porta.

Why it is called
Vena porta.

1.
The first branch
of Vena porta is
carried to the
upper office of
the ventricle.
Vena Coronalis.

2.
The Ventricle is
nourished by
bloud not by chi-
lus.
The splene onely
is nourished
with excrementes.

3.
The veine from
the spleen to the
ventricle carrieng
some wyte to
the stirring up of
appetite.

4.
Vesal. Ibidem.
The vse of the
veine to the
stomach after
Vesalius.

5.
The vse of the
veine to the
stomach after
Collumbus.
Col. Lib. 6.
Why some easely
others difficultly
doe susteyne hun-
ger.

6.
The mesentericall
veines where
they end in the
intrels haue
Membranes in
their extremitie.

it to be the head, originall, and roote of all the beynes.

In the hollow part wherof springeth a beyne, called of the Grecians *πύλα* of the Latins *Porta*, which, contrary to *Vesalini* opinion, *Collumbus* affirmeth continuall with the umbellicall beyne. The rotes therfore of *Vena porta* are diuersly solwed in the hollow part of the liuer throughout his substance. And they be sufficient thicke, chiefly as touchyng their coates, and at length in one beyne do coise and ioyne together, so constitutyng a thicke trunk, or stocke: which afterward goeth wholly out betweene the aforesayd small eminences. Whiche therfore *Hipocrates* called *Portas*, as it were the gates for the issue thereof. But afterwarde under the ventricle.

It is deuided into many braunches, wherof the first it sendeth to the upper part of ventricle. Of which braunch one part creepeth after the length thereof, and an other embraceth about his Office is a crowne, and is therfore called *Vena Coronalis*.

The second braunche of *Porta* goeth to the inferiour part of the Ventricle, and hereafter his longitude is deuided and distributed. And hitherto are these braunches of beynes committed, so that by their bloud the Ventricle might be nourished: but not therfore nourished with the iuyce *Chilus*, as some fondly haue dreamed, whiche beyng ouer thicke, also containeth in it selfe all kynde of excrementes. Neither is any part of the body (the spleen excepted which is nourished by melancolic humour) encreased by any excrement. The third braunche of *Porta* goeth forward to *Omentum*, and there in sundry sort is scattered.

The fourth is conueyed to the spleen, to transport thither the melancolic humour from the liuer. And this is a braunche sufficient great, and runneth under the ventricle, where nature hath boundred the same with many Glandules compiled together, lest it should touche the bodies of the Vertebres, or at any tyme be compressed: thence therfore it riseth, and deuiddeth the longitude of the spleen, thereunto entryng. From this beyne springeth an other, small in some, in other greates, and agayne in others greater: this climeth vp towarde the Office of the Ventricle, and there endeth. Although sometyme it is to be noted not to ascende so hygh. The office of this beyne is to drinke, and poure out of the melancolic humour into the Ventricle: and that to this end (sayth *Vesalius*) to strengthe all the functions thereof by the qualitie of his tast, which is sharpe and soluer, therfore byndyng, and bydwyng it together in it selfe, and also of nature, so bydwyng the meate to slippe out of the stomach before it be fully consecret. And this (sayth he) is true, and very laudfull vse of the melancolic humour, brought vnto the stomach, denyng to what end, or how it may serue to prouoke, and stirre appetite in the stomach continually. Which argument *Collumbus* hath agayne (notwithstandyng) approued and fortified, saying that without the same, we should in our great affaires and busines forget to take our meate: whiche might purchase decay, and weakenes in our bodies. And further affirmyng that in who this beyne is larger, in such hunger may lest be suffered: and in such as haue it lesser, they may better endure abstinence.

The 5. braunche of *Porta* is sent to the intrell Colon.

And the 6. greatest of all, to the small intestines.

The 7. to *Rectum Intestinum*, and these are the principall braunches of *Vena porta*. Of the which those iii. which are sayd to be transferred to the intrels, wher in they come into *Mesenterium*, there they are deuided into the infinite number of Mesentericall beynes: whiche do not onely embrace the intrels, but also pearse through into their inner cavitie: whereas most aduised nature hath giuen to the extremitie of euery of them a Membran, like as in the bleedbar, to the extreme endes of the betarie vessels: which both giue passage to the byne discernyng

dyng into the bleedar, and also prohibite that vpiwardes none may returne agayne. The same worke also esterne that nature hath wrought in the extremities of these pferailall beyne. Which no man before *Columbus* hath inuented, although all together confesse that the office of these pferailall beyne is to draw the iuyce *Chilus* from out of the intrels: but in neglectyng to follow the end of them, they sayled also to finde the great industry of nature, that is, by what great pollicie and arte she framed them: first that these beyne might easily receive, and draw the iuyce *Chilus*, and immediatly beyng receined, that these litle pembrans mentioned, should prohibite the egression therof agayne. And if thou aske what *Chilus* is, as one not yet possessing y^e full knowledge therof, know that it is a conversion of meate and drinke into a matter like to the substance of milke, which after it is past the Ventricle, descendeth still the turnyng wayes of y^e intrels, untill these haue sucked forth whatsoeuer iuyce is good and profitable. And so; because that to his office neither foure nor yet x. beyne were sufficient, nature created an unnumerable sort, and these in the vpper ventricles much more great, and plentifull, but the more descendyng, so much the more thinne and scarce. Neither did necessitie require them so much in the last intrelles, because *Chilus* is there now turned into dregges, and hard excrement.

As yet there remaineth an other braunch to be described, whiche is also to be numbred among the braunches of *Vena Porta*, notwithstanding that it is deriued from that which is dedicated to the splene: and descendyng on the right side through *Mesenterium*, goeth downe to the extreme end of *Rectum Intestinum*, there makynge the Hemorrhoidall beyne, which purge the aboundaunce of melancolie humour. And thus much of the originall and description of *Vena Porta* is sufficient.

The generall vse both of *Vena Porta*, and his braunches, is to bypyng the iuyce *Chilus* into the hollow of the liuer, and throughout his substance to disperse it: there agayne to be digested, and conuerted into red blood like the substance therof. In which digestion are two excrementes engedged, as choler both Citrin, and blacke: Of which yelow choler like vnto the fire, is receiued of a litle vesselle, which nature in the hollow side of the liuer hath collocated and ordained: but the melancolie iuyce is sent by the fourth braunch into the splene, to nourish it.

Further, although these beyne were forgotten for the translation of *Chilus*, neuerthelesse, they haue also an other vse, no lesse necessarie: since they cary with them the blood, that nourisheth the vetricle, intestines, *Mesenterium*, and *Omentum*. But this by the way, *Columbus* wiseth vs to note (though agaynst the minde of Galen) that in these beyne is not the vertue of makynge, or transformyng blood: whiche is easie to discerne, to such as diligently marke the white substance, and thinne coate of the beyne. For by what meanes may *Chilus*, by their tenuitie and whitenes, it beyng also white, and thicke, be turned to pure red, and thinne blood: while nature hath eche where ordained, that euery member of mans body, that hath the office to conuert any thyng, both transmute, & chaunge it into his owne colour, as is to be noted by the testicles and womens brestes. Also the Ventricle sheweth it playne, for whether the meates that we eate be white, red, yelow, greene, or other colours, all those notwithstanding it conuerteth to white, the colour of his owne substance. Here also the testicles, &c.

At now in the Gibbous part of the liuer, where the substance thereof seemeth greater, and thicker, springeth a beyne called *Concaua, Chilis, or Magna*, beyng the mother of all other beyne in our body. To this are diuers thicke and great rootes, which are inserted in the substance therof from the toppe to the bottome, and do all at length constitute that large beyne, which is extended and ramified both vp to the head, and downe to the foote. This beyne is rightly com-

pared

The great industry of nature as touching the abierat: all beyne unknowne to other Quasomites before Columbus. What *Chilus* is.

How the digestion of *Chilus* is made.

Why there are more beyne in the vpper then in the nether intrels.

8.

The Hemorrhoidall beyne.

The vse of *Vena porta* and his braunches.

The generatō of yelow and black colloy.

The sheweth beyne haue a double vie. Col. libid. Gal. 4. vi. part. What beyne do not make blood.

Euery thing that altereth chaungeth that, that is to be altered into his colour. The Ventricle chaungeth all meates into white.

The beyne called *Concaua, Chilis, and Magna*.

The fift Booke of the

Alke partes of
the body are nour-
ished by blood.

The coming of
Vena cava to the
hart.

Coronalis vena is
the hart.

The rising of the
veine without a
fellow called Asy-
gon.

The Intercoſtal
veines.

Veines sent
from the beyne
without a fellow
to nourish the left
side.

The veines that
nourish the verte-
bres and ſpinall
marrey.

Veines called
Axillares.

The rising of the
veine called hu-
meralis, or Cepha-
lica.

In what place
Cephala and Basi-
lica is united.
Where is the
new common
veine.

pared vnto a great riuer. For from thence as there be many dikes iſſuing, ſo be-
ry many braunches are deriued from this beyne, like litle brookes, and runnyng
dikes, which are ſpread abroad throughout the whole body, tranſpoſing blond to
euery Membran, of late made, and laboured in the liuer.

This *Vena Concaua*, in aſcending vpward from the liuer toward the head, per-
forateth the midriff, in what place it is diſtaunt from the bodies of the Verte-
bres, and in that place putteth forth two beynes, whiche, agayne deuided into
braunches, are diſtributed throughout the ſame *Diaphragma*. Which done, this
Vena Cava, runnyng almoſt immediately to the right care of the hart, is ſet vpon
the Orifice of the right ventricle of the hart connea, and knit therewith, comple-
ting it euery where on the outſide, not beyng carped into it.

In this place it bringeth forth a beyne, whiche compaſſeth, and embraceth the
hart like vnto a crowne, wherfore accordingly it is called *Coronalis Vena*.

Furthermore this hollow beyne aſcendyng vp towardes the head, is caried vp
aboue the lunges, & there diſtaunt from the Vertebres. And aboue the hart
no ſmall ſpace, thruſteth forth the beyne without a mate, called by the Grekes
ἀσγόν, whiche although it be in the right ſide, yet hath his begynnyng from the
middeſt, or as it were the centre of the hollow beyne, which is reflected neare the
bodies of the Vertebres, and downe to the extreme part of the breaſt deſcendeth,
ſendyng braunches both on the right and left ſide to the ſpaces betwene the ribbes,
for the nourishment of thoſe partes. And although this ſtocke lye in the right ſide,
yet neuertheleſſe vnder the lunges, *Æſophagus*, and great Arterie, are braunches,
thence ſcattered, to cheriſh and ſaue the left ſide.

From the ſame right trunk or ſtocke, whileſt it begynneth to be reflected,
breaketh of an other braunch, which aſcendyng vpwardes, dedicateth braun-
ches to the ſuperiour ſpaces of the vpper ribbes, and not onely in the right ſide,
but in the left alſo, except in ſome, and thoſe very few, in which a litle braunch is
deriued on the left ſide from *Vena Axillaris*, and carped now to two, now to three,
and ſometyme to one of the ſpaces betwene the ribbes onely.

From all theſe beynes nourishyng the ſpaces of the ribbes, as is ſayd, there
ſpyng yet other veines, which go in betwene the Vertebres, where the holes
be for the production of Nerues. Theſe beynes nourish the ſayd Vertebres, and
ſpinall marrey, and enter in at the holes ſited behynd the bodies of the Verte-
bres. From theſe further, beſore they enter in the ſpinall marrey to nourish it,
beynes are alſo ſent to the Muſcles of the ſkinne and backe.

Moreover aboue þ beyne without a fellow, the hollow beyne aſcendeth, ly-
meng a loſt þ rough Arterie, ſtraight vp the height of þ Cannell bone, there
putting forth y. great beynes called *Axillaris*, becauſe they go vnder þ armehole:
which betwene the Cannell bone, & firſt ribbe, do paſſe by the caviſie of the breaſt.

Then after from him ſtretcheth the humerall beyne called alſo *Capitalis* or
Cephalica, which neuertheleſſe aſcendeth not to the toppe of the ſhoulder:
but rather is caried after the inner region, and paſſing forth betwene the firſt and
ſecond Muſcle of the ſhoulder, ſtretcheth to the outer partes, and there lyeth eu-
ident aloft. For when it is paſſed through the ſleſhy Membran, it goeth betwene
it and the ſkinne to the cubite, and is caried outwardly neare to the firſt Muſcle
that boweth the cubit: at which bought it deuideth in two braunches, wherof one
goeth to the inſide of the cubite, and in departyng from the bought therof it is
nited with an other like braunch of *Bafilica*: of which two is made the true com-
mon beyne. But the other bow of the aforeſayd beyne, in the outſide of the cubit,
both aboue & outward produceth many braunches: but at length, the chief braunch
ſtretcheth aboue the weſt, and extreme part of the hand, betwene the litle fin-
ger and the ryng finger, and this diuiſion is carped to the extremities of either of
thoſe

those fingers. And this is the veyne commonly called of each Practitioner *Salvaticella*, the opening of which they beleene to profit much in the effectes of the spleene. To which (of truth) me seemeth no reason can consent.

After that this *Vena Axillaris* is gone from out of the hollow of the brest, and hath committed from him this veyne lately described, it plungeth it selfe deeply vnder the Cannell bone at the Processe of the scaple called *Anchiroides*: in which place it obtaineth very many bzaunches, whiche nourish the first Muscle of the arme, and not onely it, but also the second of the scaple bone, and the second of the brest, and the fourth, and seventh of the shoulder, and the scaple it selfe, and all the space euen to Abdomen. Besides these, in women, you must vnderstand that other bzaunches are conuenient to the nourishyng of the brestes.

Furthermore this *Axillaris Vena* beyng caried to the shoulder, vnder the first Muscle bowing the cubite, is deuided into iij. and those notable great veynes. Wherof one is called *Basilica*, or *Hepatica*, the inner veynes (after Hypocrates) of the cubitte.

This veyne, which we haue said to pearse so deepe, cometh aloft by litle & litle to the extreme end of the shoulder bone: & where the cubite boweth, like to *Cephalica*, it is deuided in two, wherof the one is vnited in the inside of the cubite with a bzaunch of *Cephalica*: in which place is made the common veyne. That is to say, common, because it is partaker of both the veynes. Which bzaunches constitutyng the same, are called *Mediana*, most commonly opened of euery Practitioner. But here is to be noted, that neare to *Cephalica* & his *Mediana* lyeth no nerue, so as there doth to *Basilica*.

An other bzaunch is poured forth by the exterior part, and diuersly conioyned: for now with a bzaunch of *Cephalica*, now with the common veyne *Per Anastomosis*: at length it sendeth bzaunches aboue the wrist and backe of the hand, as also to the middle finger and forefinger.

The other apparaunt veyne, which is called common, in the middest and inside of the cubit is caried obliquely aboue *Radius*, and fōdzy wayes deuided, sendeth a bzaunch betwene the forefinger and thombe, and betwene the forefinger and middle finger, and coaleth at the endes of them. And this bow was wont to be opened in affectes of the head. But of the other two great veynes called *Axillares*, the one lyeth sufficient deepe, and vnder it fine Perues, it is litle distant, but rather toucheth the bone of the shoulder; and sendeth out bzaunches to nourish the two Muscles that bow the cubite: then forthwith runneth betwene the first, and second Muscle, and aboue the bought in tripple sort deuideth: there committynge a sort vnto the inner Muscles of the cubite. Then searchyng further, is inclined to the wrist, and vnder the Ligament haue recourse vnto the ball of the hand, not sparyng there to dedicate surcles for the nourishyng of these Muscles which are in the end of the hand: besides that to euery finger they apply two litle veynes, which after their sides to their extremities are caried. An other bzaunch passeth at the bought, by that Ligament that is sited betwene *Cubitus* and *Radius*, and is distributed to the exterior Muscles. The other *Axillaris* in the middes of the shoulder is reflected toward the posterioir part, limityng bzaunches to the Muscles extendyng the cubite. Afterwardes it tendeth more downeward to the longest Muscle and to the two horned Muscles, and to those Muscles, which haue their begynnynge from the outer tubercle of the shoulder, and so is it among these Muscles dispersed.

In the same region vnder the Canell bone, where is the begynnynge of the *Axillares*, thou mayest also see spyng foure descendēt veynes, wherof two descend vnder the bone of the brest, in the side partes neare the Cartilages of the ribbes: these go downward, and passing beyond the brest do march through the

The error of certain in the location of Saluaticella in affectes of the spleene. The distribution of Vena Axillaris issued out at the brest.

The veyne called Basilica, or Hepatica, and after impudicates.

The common veyne why it is so called. Mediana Vena. Not nere Cephalica but Basilica lyeth a Nerue. Anastomosis is a coniunction of iij. veynes in one, and sometyne of an Artery and a veyne.

The veyne accustomed to be cutte in diseases of the head. The progresse of the two great veynes Axillares.

The four veynes to the muscles of Abdomen.

The fift Booke of the

The *veynes* which in men nourish the anterior *Muscles* of Abdomen: in women moreover engender milke.

The *veynes* to the *Muscles* and sinne off head, and partes of the face.

Of the *veynes* to the eye browes soyned & agayne disioyned.

The progresse of *Iugularis Vena* toward the seat of the skull.

The *veynes* nourishing the *Muscles* and glandules of *Larynx*.

The *veyne* that is opened in the disease called *Angina*.

The *veine* sownen in *Dura mater*.

Veynes nourishing the substance of the *braine*.

The part in the *braine* called the *pyelle*.

The *veyne* constituting a meningeous cautie.

The ramifying of *veynes* through the hard & thinn *Pembran* and entering into the substance of the *braine*.

straight *Muscles* of Abdomen, whiche in some women are ioyned with an other *veyne*, whiche from the inferiour part riseth to the same *Muscles*. These descending betwene the fourth and fift ribbe, sometyne higher, & sometyne more crooked, direct them selues to the outer part, in men to nourish the Anterior *Muscles*, and in women not to that end onely, but for the generation of milke, being dispersed in their pappes. The other two go downward about the hollow of the lunge, neare to *Mediafinum* and above *Pericardium*, together with ij. *Nerves*, which are brought to the Tendon of *Diaphragma*.

Somewhat higher appeare foure *Iugular* *veynes*, two outer, and two inner: the two outer immediately about the Canell bone, scatter the twiggess unto the *Muscle Epamyda*. And the stocke or trunk after the scapple bone rising obliquely by the sides of the necke, sprinkleth forth partes to the *Muscles* scruping the head, and after the hinder part of the head upwardes to the skinne of the head, & to that part of the outer *Iugularis* which is left. Above the nether iawe it offeth it selfe to the *Muscle* called *Masseteres*, & obliquely is caried through the middest of the face to the greater corner of the eye: neuerthelesse distributing some *braunches* to the *Muscles* of the face, sendeth a *veyne* into the corner above the roundell, and that through the *Muscle* constringing or pulling together the eye lidde: the remnaunt ascendeth betwene the eye browes to the skinne of the head. But this note, that in some betwene the eye browes the left with the right is ioyned, and agayne disioyned.

The other *Iugular* *veyne* is sufficient great, caried upward towardes the seat of the Skull by the Anterior partes of the ouerthwart Processe of the *Vertebres* of the necke, neare the rough *Arterie*.

The *veyne* whiche we now speake of, under *Larynx* putteth forth a notable *braunche*, with whose twiggess the *Glandules* and *Muscles* of *Larynx* are nourished: the same *veyne* is also diuersly devided under the inferiour iawe. Notwithstanding the diuision therof is lesse whē it cometh to the *Glandules* under the care, scruping to *Hyoïdes*, and to the tongue it selfe: and that beneath. This *veyne* the Physicians commaund to be opened in the disease called *Angina*: the rest of this *veyne* is distributed to the iawes & also to that tunicle that inuesteth the mouth.

The greater trunk of the sayd *veyne* entred the Skull through the vnequall hole, by which the vij. payre of sinewes of the *braine* descendeth. But being entred, immediately it is conuerted to the posterior partes, and sent into *Dura Mater*: but carieth his tunicle with him, and ascendeth by the hinder part of the head, unto the toppe almost of the Labdall Suture, in which place, the right side with the left is ioyned, and *Dura mater* duplified. From the posterior part it is caried to the forehead by the supreme part of the *braine*, and inserted in the round hole betwene the forehead and *Isthmoïdes*: in the hinder part of the head, where the *veynes* did coite and ioyn together in one, it is admitted into the quadzuplication of *Dura mater*. And fro thence ij. *veynes* go forth after the whole longitude of the vpper ventricles, which *braunchinges* nourish the substance of the *braine*.

But the quadzuplication of *Dura mater* above mentioned, is called a *pyelle*, & lyeth betwene the *braine* and *Cerebellum*.

Agayne, the *veyne* goyng by the superiour longitude of the *braine*, constituteth a marueilous cell or cautie. For about it sheweth the playne paterne of a halfe circle, but hath beneath ij. corners, whiche in this place are sometyne larger, sometyne streter. It spreadeth it selfe in a diuers fashon: and the *braunches* of it after they haue perforated *Dura mater*, are ramified abroad through the thinn *Pembran*, all about it, and in diuers sorte now upward, now downward. But when they are passed through the thinn *Pembran*, they enter the substance of the *braine* it selfe.

And

And here my Authour supposeth this will seme nelues vnto the Reader, because before him neuer any found out, that veynes and arteries entred the substance of the braine. Under this substance of the braine the inner *Iugularis*, before it enter the Scull, sendeth forth his portions by the laterall partes vnto the temporall Muscles, and in the Scull it selfe to the sides of *Dura mater* next to the Canell bone. This veyne bringeth forth another litle veyne, whilest it ascendeth after the transuerse Processes of the Vertebres of the necke, and putteth forth branches to the nourishment of the Muscles of the necke: the same in some booyes springeth from the veyne *Axillaris*.

But where betwene the Vertebres of the necke Perues go forth, whether this veyne hasteneth, to the nourishment of the Vertebres and Spinall marrow. Upo the first Vertebre it runneth towarde the hinder part of the head, where the hole is euident that pearleth to the organ of hearing, which it entred to nourish all the same organ. And by this inner *Iugularis* are all the bones of the head, teeth, upper iaw, and nether, cherished: neither is there wherefore to expect the description of any other peculiar brainth of a veyne to serue vnto the teeth onely.

Considering the hollow veyne, after it hath gone forth vnder *Diaphragma* from the liuer his proper fountaine, it cleaueth to the body of the Vertebres on the right side, and after the goyng forth therof a litle beneath the liuer, putteth forth a small veyne to nourish the partes adiacent, and is diuersly denominated. Afterwardes the same trunk goyng downwarde, putteth forth it. veynes called *Emulgentes*, which are ended in the veynes. But beware thou esteeme not these to be alwayes onely two, since sometyne you shall finde them deuided into three, yea foure, some whiles fure, albeit not commonly so noted of other writers.

Galen principally, and also diuers other Anatomistes haue vsed heretofore long discourse of wordes, as touchyng the putting forth of the Emulgent veynes, auouchyng the right veyne to be higher eralted then the rest, and so: what cause: though in deede in vayne. For since truth is contrary vnto them somuch, as that they would by pollicie inuent the reason of that which is not so, both the proposition, and argumentes of force must fall together, like him that whilest he more endeuoureth to decke the toppe and sight side of his house, then hath care to set firme his foundation, his time, and coste both perish together. Wherefore *Collombus* saith, the reasons of Galen are more ingenious then true, as touchyng the body of man (fro which no part of these my labours by my will shall swarue) whose veynes *Emulgentes* thus we will describe.

From the left side of *Vena cava* vnder the diaphragme, sheddeth out a large veyne, sufficient long, called *Emulgens*, which is caried aboue the body of the turning ioyntes, and the Arterie *Aorta*, flowyng to the middest of the left reyne, which is in man somewhat higher then the right, and that for the litleenes of the spleene, which not resistyng romthe to it (as both the liuers greatnes on the other side to the right kidney) leaueth it in the higher state, the right veyne compelled to stand lower. But after it is come vnto the reynes by the aforesayd meanes, it entred the body therof, there beyn amplified and cut into branches, which throughout the substance of the reynes are distributed. Pencerthelesse, *Collombus* would not haue vs thinke of these to be made the searse, whereof Galen esteemed so much, and that through it the Urine is streined, and it beyn dilated bloud to be pissed.

Were in deede nature (sayth he) might haue bene able to place Membrans as to the Piferical veines, and to the endes of the byeters: but, because this seemed more commodious vnto it, there are certaine eminences begotte of the same substance of the reynes, which entring into the same branches, resist that the bloud, which together with the serous matter is deduced to the reynes, should naturally slippe forth agayne. This notwithstanding beyn noted, since it is, notable,

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when

A new thing to the other Anatomistes before *Collombus*.

The veyne nourishing the bones of the head, vnto the upper iaw and nether.

The course of *Vena cava*.

The veynes called *Emulgentes* not alwaye aling in number.

Galen in vayne vsed reasons as touchyng the situation of the Emulgent veynes as touchyng many body.

Coll. Lib. de Epore.

Coll. Lib. de Epore.
The description of the Emulgent veynes.
The situation of the kidneys.

There is no such searse in reynes as others haue feigned.

How bloud happeneth to be made with Urine.

The fift Booke of the

When nature enduozeth to thrust downe any Stone, that commonly is done with such force, as that it sendeth out great store of blood together with the vyne.

The vse of the Emulgent beynes.
The Vrinare vessel named Vreter.

The vse of these Emulgent beynes is to purgethe blood of ferbus substance, and to the reynes to yeld due nourishment. From this beynes springeth a vessell called Vreter, that is *Vrinarius*: it springeth in every deede from the body of the same reyne, there it taketh Urine, and bringeth it to the bladder.

The left Seminall beyne.

In the right side the same Emulgent beyne is sited lower then the left, and shorter farre: for betwixt the hollow beyne and the right kidney is a small distill, yet is it set to in the same order as the left.

The false opinion of other Anatomistes as touching the beginning of the seminall beyne.

There springeth from the left Emulgent a beyne called *Seminallis*, or a seide beyne, whiche obliquely vnder *Peritonaeum* descendyng, and caried aboue *Os Pubis*, is reposed in the testicle, as moze apertly among the generative partes is discussed.

Col. Ibid.
The true cause of the beginning of the seminall beyne.

But this marke by the way, that this springyng of the *Seminarie* beyne is not from the Emulgent to carie the serous humour to the left testicle whereby the feast of *Venus* might with greater pleasure be celebrated, as many of the auncient Anatomistes heretofore haue deuised. For (say they) nature therfore determined the begynnynge of one of these Seminall beynes to be so farre of, to the end that in the act of coiture, the tricklyng downe of the humour so long a scope; should onely be to purchase the greater delectation in that present tyme.

The rising of the right Seminall beyne.

But the true cause (sayth *Realdus Collumbus*) is the littleness of the sayd beyne, which if it should haue sprung out from the body of the hollow beyne as the right doth, because it should then haue gone ouer the great arterie, it should euer haue bene in daunger in euery great dilatation, which the same Arterie must nedes make, to be broke. Whiche incommoditie to preuent, prudent nature deuised a needefull meane: willing therfore that from the left Emulgent beyne, and not from the body of the hollow beyne, the left Seminall passage should take his begynnynge.

The length of the Seminall beynes marked not the greater delectation in Coiture.

Contrariwise the right Seminall beyne floweth out from the fountaine of the hollow beyne, the space of y. or iij. fingers breadth vnder the right Emulgent, which first descendeth obliquely, then is caried vnder *Peritonaeum*, after aboue *Os pubis*, but lastly endeth in the testicle.

The diuision of Vena cava at the 4. Verrebbe of the loynes.

And this is the race of the Seminall beynes in men, with a moze likely coniecture then among the auncientes was knowne, or imagined: who would by their assertion proue (as it seemeth to me) that the longer the Seminall beynes were, the greater delite had the body in the act of generation. Which if it be so, then proue they also that men haue moze pleasure in the vse of benerie then the woman: whose Seminall beynes hauyng the like begynnynge and endes, yet but halfe towardes the length of those in man, for that her testicles are sited within the body, neuer commyng to the toppe of *Os sacrum*. But it is marueilous, vnder the right Seminall beyne, to the fourth Verrebbe of the loynes, to be no beyne sent vnto the superiour partes but onely to the inferiour partes. For from the liuer downe to this place, betwene the Verrebres, where the *Perues* go fourth, the hollow beyne profereth portions, which both nourish the Spinnall marey, and the body of the Verrebres.

The distribution of Vena Cava to the inferiour partes.

Notwithstanding immediately as *Vena cava* is come vnto the fourth Verrebbe of the loynes, it is deuided into ij. notable armes, whiche obliquely beyng caried aboue *Os Ilium*, and *Pubis*, make their iourney downewardes the one to the right, the other to the left legge. From the which diuision, first spring beynes sufficient great, which downewardes abroad, but first towardes the fundament, disperse them selues. For where the same diuision cleaueth to *Os sacrum* he traſmitreth his armes through the holes therein to the Spinnall marey, to the same *Os sacrum*, and to the Muscles sited in the loynes, whiche take their begynnynge from

from this *Os sacrum*. For euer committynge his branches to the Muscles of the buttockes, scruping to the thigh.

From the same armes those veynes are purchased, which are implanted in the extreme end of y^e straight intrell. Fro^t this same veyne go forth those veynes, that vutte the sides of the bladder to nourish it, and the Muscles scruping to the straight intestine, and that in men. For in women they go to the beginning of the necke of the matrice, out of which place their mensstruous purgations flowe from them. The same branch that nourisheth the bladder cherisheth the necke of the matrice. And the same principall diuision sometime begetteth a veyne, which descendeth, and downe abroad is receiued in that hole which is placed in *Os pubis* and *Coxendix*, and to the *ir. mdr.* Muscle turninge the thigh about transpore themselves, to nourish them: yet further to the *ir.* and beyng strewed through the inside of the thigh, haue there an end.

This neuertheless by the way is to be marked, that the seminarie vessels in women end not in the head of the testicles, but be poured downward to nourish the substance of the matrice. Fro^t these veynes the umbellicall veyne taketh his beginning, whereto is attributed the originall of our generation.

The same diuision of *Vena cava* putteth forth 4. veynes, that is to say a right, and a left, which are vnderwardes refleged toward the head. Their progresse is betwene the diuision of *Peritonaeum*, and above it, degeneratynge into armes and branches: 4. vnder the straight Muscles, euen to the second interfection of them, are distributed, to cary to the said Muscles and *Peritonaeum* nourishment. These be the veynes, by which Hypocrates and Galen asseigne such cosense to be in women betwene the matrice and bladder, the which sometimes may be found united with those 4. veynes, which downwardes descendynge vnder *Stethon*, are placed in the end of the straight Muscles.

In some bodyes they are ioyned onely in one part as two with a very small branch. But *Columbus* sayth that in some bodyes of women, what diligence soeuer be v^sed, yet might be not possibly finde the vniou of these veynes. But this he sayth, that they come not from the nature, but from that diuision whence the veynes of the matrice do spring, which are not instituted to cherish the substance of the wombe, but to nourish the necke thereof.

By those veynes *Menstrua* are expurged, and not passing through the matrice, as *Columbus* testifieth in the aboue named place, where he alledgeeth the authoritie of very probable dissections, which he practised for the purpose. This thicke arme, or holwe deuided from the stocke of *Vena cava*, when it cometh aboue *Os pubis* without Abdomen, is brought into the flanke, here begettynge very many branches which nourish the Glandules there reposed, in which Glandules happen the tumors called Bubones.

From the same place veynes appeare which walke through the yard, betwene the skinn and fleshy Membran euen to the end of *Prepuceum*. His branches also are through the purse of the testicles disseminated.

Out of the same place whence we haue sayd all these veynes do spring, goeth forth a veyne most euident, which obliquely ascendeth to *Ilium* or, marchynge vnder the skinn toward the outward partes of the ribbes, and aboue Abdomen is shed out in diuers branches.

This notable arme which a litle before we haue mentioned after it passed ouer the flanke, it goeth forth in three partes, wherof one descendeth obliquely inward towardes the knee betwene the skinn and fleshy Membran, and aboue it on the inside descendynge through the legge, trauaileth aboue the inner ankle, and vpon the soote towardes the toes, especially the great toe where it is diuersly bestowed. This is that veyne of name called *Saphena*, out of which in diseases of

Whence Menstrua
do flowe in wo-
men.

How the Semina-
rie vessels in wo-
men are constitu-
ted.
The originall of
the Umbellicall
veyne.

The veynes of
Cava nourishing
Peritonaeum.

What veynes
make consent be-
twene y^e matrice
and pappes.

Though what
veynes Menstrua
are purged.

The glandules
wherem Bubo
springeth.

The veynes to
the yard and
purse of the
Testicles.

The veyne called
Saphena.

The fift Booke of the

the matrice blood is wont to be loſed, in the beſt enſe wherof very many braches be here and there ſent both to nourish the ſkinne, as alſo to engender fat.

The other y. thicke bowes or armes are carped covered of Muſcles, not withſtanding that obliquely they beſtend through the inner partes of the thigh, and paſſe forth, betwene the y. lower heaves of the thigh, thus caried under the ſkin: firſt diſtributyng many branches, which cauſe the thigh where it is bowed.

But from the greater branch, which we haue ſpoken of, fiſth a veyne, which under the ſkinne firſt, then after through the harder partes of the legge, runneth cūe to the ſote. Under the ſame bought of the ſkinne another veyne breaketh out, which nourisheth the Anterior Muſcles of the legge; and an other alſo deeper: thus beynge carped downward, it cleaveth to the Ligament tied betwene the Tibia & Fibula, which it perforateth, cramping to the Anterior partes of the legge; and deſcendynge aboue the ſote, is twiſt the Ligament ſer of coherent.

A greater branch goeth ſo lowe, that it runneth cūe under the ſole of the ſote by the inner ankle, ſprinklyng in the legge and ſole of the ſote divers branches, ſurcles, and twigges.

An other branch likewiſe very notable is ſent alſo through the Muſcles, and ſendeth a veyne under the y. firſt Muſcle tied behynd in the legge, where their Tendon beynneth. Hence it riſeth up, and under the ſkinne ſhoweth towardes the anterior partes, beynge finally tranſmitted to the outer ankle of the ſote. And this is that veyne of mans called *Vena Scia*, *Iſchy*, or *Coxendicis*, & therfore in ſuch diſeaſes is opened. The branch that is bozne under the knee is named *Vena poplitea*, which in ancient authorities is often mentioned. From which veynes, as alſo fro others afore deſcribed, very many ſurcles and twigges ariſe, which beynge ſmall, and diſperſed hether and thether diuerſly, with vncertaine order, and unlike at all tymes, for auoydng unproſitable proliſtic, my without all further endeavour willingly omitteth, and I, not deſirous to offend in to much diligence, do here by ſumme the ſote of this matter, leſt it be ſayd unto me as *Antalcida* answered the proſent of the Perſians: whoſe ſyng ſendynge him a garland of roſes, touched once beſides with ſome odiferous ointment, I receive quoth he the gift & I praye the promptitude of his mynde, but he hath loſt the ſauour of the roſes, and frangrantie of their nature, by deſpaynyng and falſifying their Arte. This therefore ſhalbe ſufficient to the ingenious reader, wayng well, the firſt creation of the veynes to be for the traſpoſyng & conuayng of blood, the lively nourishment, to all partes of the body, ſo ſo ſayth *Columbus* all members are onely nourished by blood. Wherefore nature deuised the veynes hollow, to the end that like riars they ſhould runne throughout the body, haueg coates made thyme, yet of ſincere ſubſtance; and made (as *Galen* affirmeth) of Membranes, and Fibres, tough therfore, and able, not in prompt to euery ruption.

Leonardus Frichſ. de humani corporis fabrica comprehendeth all the veynes of the body within the number of ſix, as the roſes of all the reſt. That is, one procedynge from the hollow ſeat of the liuer, and runneth into the veſſicle of choler, into the ventricule, into the ſplene, *Meſenteria*, and *Omentum*.

The ſecond of the Gibbus part of the liuer, into the reſt of the body (the lunges ſuely excepted) and is diſperſed with an innumerable part of branches.

The third from the right ventricule of the hart is ſpread into the lunges, onely that veyne maketh this peculiar chalenge, becauſe it conſiſteth of the body of Arteries to be called *Arteria*.

The fourth is produced from the Panell into the liuer, and onely ſerneth to the nourishment of the infant. From theſe all other veynes, that wander by and downe in mans body are mutually deriued, and take their begynnynge. And this is the end of Veynes.

Vena ſcij, Iſchy, or Coxendicis.

Vena Poplitis.

Adian. Lib. 14. de Var. hui. Antalcida his answer to the Persian present.

Col. Ibidem. Fuch. Lib. 3. cap. 14. The brittle of veynes. All partes are nourished with blood onely. Why veynes were made hollowe. The ſubſtance of the veynes. Gal. Cap. 3. Lib. de inæqual. incomp. Fuch. Lo. predicta. How all veynes are comprehended in the number of ſix.

2.

3.

4.

The bladder, that is the receptacle of yellow choler, and called of some *Cistis Fellis*, of others (though more rudely) the Gall or purse of citrin choler, hath his seate in the hollow side of the liuer. For on what side the liuer amplexeth the right side of the ventricle, there is a cauitie engrauen exquisitely agreeing to the middle portio of the gall. And to that cauitie the middle superiour portion of the same vesicle after the length therof groweth: but the inferiour part of it, without the substance of the liuer hangeth downward.

It is in foure long and round, by litle and litle downe to the point of the bottom thereof like a certaine log fashioned peare enlarging, so that with a narrow mouth, & more ample bottom it consisteth. For it being required that the rest of the body therof, should be large & capable, because it could not be made exactly round as a globe, the cauitie is after the longitude therof augmented: therfore nether affected with any incommoditie by the stomach, nor ouermuch insinuated in the liuer.

But that being emptied it might flat or shrinke in, like as by filling extend, it is constitute of Membranous and sinewy substance, consistyng of one simple and peculiar coate, thynne, but hard and firme enterwoven with threefold manner of Fibres. The straight be inmost, the next are the oblique but fewer then the straight, the outmost are the orbicular or transuerse Fibres. To this tunicle of the gall is lent an other from the coate of the liuer, not to the whole vesicle, but to that part onely that hangeth without the body of the liuer, whiche alone needeth it for an inuolucrum and propugnaculum.

This vesicle although it growe in due to the liuer the shoppe of sanguification, notwithstanding it taketh vnto it y. very small beynes from the stocke of *Vena porta*, in that order diffused into his coate, as we see the litle beynes scattered into the adherent or white tunicle of the eye. Also from the Arterie reached out to the hollow of the liuer, a very smal branch is offered out to the same, wandring euen to the very extreme part of the bottome thereof.

Neither is the same destitute of sinewy relief, lest likewise of sense it should be frustrate. For the Perue of the liuer beyng lead by the lower Membran of *Omentum*, and brought from the right side or stocke of the vj. payre of sinewes of the brayne, reached out to the rootes of the ribbes, deliuereth forth a surcle to this vesicle, in leane bodys almost no lesse euident then the Arterie.

The wayes of this vesicle made to receiue and put forth are thus. The necke of the vesicle (somewhat harder then the bottome) endeth by litle and litle at a strate porie passage, at that part of the liuer, whence *Vena porta* taketh his begynnynge. Whether when it is come, it diuideth into two Processe, one reaching vppward, the other downward. That which is caried vppward lyng to the Anterior side of *Vena porta*, ascendeth into the liuer, and therein beyng in two partes dissected reacheth one to the right side, the other to the left. Euery of these also in the liuer are digested into other surcles, and those agayne into others, vntill they haue constituted an innumerable order of branches, through the body of the liuer betwene the armes of *Vena porta* and *Cana* diffused. And these are the surcles or branches, by whose labour choler is drawne into this vesicle.

But the Processe of that way of the vesicle which reacheth downward, vnder set with the inferiour Membran of *Omentum*, hasteneth downe somewhat obliquely, and is implanted to *Duodenum* not farre from the begynnynge of *Ieiunum*, nay to the begynnynge of *Ieiunum* sayth *Collumbus*. This Processe (wherof before is made mention) carieth choler expulsed from the vesicle into the intrells, in the meane tyme neither admittynge any of their iuyce or windynes, nor any of the choler to regurgitate backe agayne, because they haue into the intrell not onely a withyng entraunce, but it is brought to passe by the benefite of two Membrans, blackly set to the sides of the Orifice, lightly yeldyng way to the waight of choler

passyng

The bladder of
choler.
Col. lib. 11. cap. 8.
Situation

Vesal. lib. 5. cap. 8.

Figure.

Substances.

Fibres.

Tunicle.

Veynes.

Arteries.

Nerves.

The passages or
wayes of the
bladder of choler.

The branches
wherby choler
is drawne into
this Vesicle.

The passage of
choler inserted to
Duodenum after
Vesalius, to *Ieiunum*
after *Collumbus*.

Loc. Cit.

The use of the
passage to the in-
trelles.

The industry of
nature in the pas-
sage to the intrells.
The use of the
membrans set to
the orifice of this
passage to the in-
trelles.

The fift Booke of the

rulhyng in, as also wholly inhibityng the returne therof into the passage agayne.

The error of
 sundry Arabians.

But the same passage inserted to the gutte is for the most part simply one, and in very few two, or devided. Wherfore there is ouer playne proofe that *Rasis*, *Mudinns*, *Valescus*, & *Carpus*, with others of that Arabia sect, were exceedingly deceiued, who affirmed that nature continually had assigned y. wayes for the vomityng forth of choler from his vesselle: as one to the intrels, an other to the ventricule. For if choler should so haue recourse vnto the ventricule, the same should by the biting therof (as *Gal. 5. v. s. partium* affirmeth) perpetually provoke or rather compell the ventricule to aduoyde the meate: nether should it so much vse the retentive facultie, as whilst the meat were concocted.

What incommo-
dities might hap-
pe by choler com-
ming to the ven-
tricle.

What Vesalius
once sawe as con-
cerning the com-
ming of choler to
the ventricule.

Vesalius confesseth he neuer saw it in all his tyme but in one onely man, who in diuers other organs, and specially about the ribbes and Muscles of the brest, as he barred from the workemanship of other bodyes, so had he one passage also of choler that visited the ventricule, beyng a man of state, and temperature of body, boate and dry.

It is agaynst na-
ture when choler
belcheth vp to the
ventricule.

Realdus Collumbus neuer found it, although he protesteth him very often & diligently to haue searched for the same. But he denieth not whē there is great aboundance of the same yellow choler, that it accustometh to regurgitate, & belche vp to the ventricule, albeit the same is agaynst nature, & not accordyng to nature.

The vse of choler
to the intrels.

Contrariwise nothyng resisteth the incourse therof into the intrels, since there the gift therof is notable, cutting, purging, and wiping away all grosse flegme, or vnprofitable humours heaped in those small passages. Furthermore by styrring and biting, prouoketh their proppertie to a small extrusion of the excrementes. And it selfe also together with the excrementes, yeldyng no hurt (when as in man all thynges are dispensed by the law of nature) but great good purpose, is at length put forth from the body. Of very right therfore the passage carieng choler is in the guttes, not in the ventricule, implanted.

What is choler.

Choler is, as all sufficiently know, the thinne excrement of blood: like as melancolie is the thicke dregges of the same.

The situation of
the splene.

The splene consisteth on the left side of the ventricule, more after the inferior and posterioir partes. It cleaueth to the left part of *Septum transversum*, almost in the middest betwene the left side of the bodies of the Vertebres, and the Cartilages of the false ribbes.

Figure.

In fourme it is correspondent to the proportion of his seate, and like vnto the liuer impressed in him selfe by the partes adiacent. For where it toucheth the midriff, as the same is their somewhat hollow, so accordyngly the splene in that place is bounched or Gibbous. Where the ventricule after a certaine sort lyeth on the splene, as it is large, and there like a great globe extuberāt, so in like case the splene a litle, and in the vpper part onely is hollow. For in swine, Dogges, and Dren, whilst it is longer but narrower, and stretched in longer space to the Gibbous part of the ventricule, it is in them more hollow, and more compleateth the ventricule in maner of the forth part of a circle.

Magnitude.

Contrariwise in man the splene is thicke, great, and broad, though shorter then in such kynde of creatures, and yet for all that not exactly foure square. The length farre exceedeth the bredth, for the lower part of it stretched forth more to the anterior partes of the body, endeth at a blunt corner: but the vpper part, into a more obtuse corner is compessed. The left side is somewhat gibbous, the right easely hollowed with its light impressiōs. The hollow of the splene, with a more profound lyne reached after the length therof, aboundeth, which directly proceedeth, & vnequally here and there swelling forth, admitteth the sinuated vessels of the splene.

Where the vessells
are admitted.

Choler of the
splene.

This bowell moreover in man is naturally endowed with a certaine blacke & very obscure colour, but in a dogge hath for the most part a more splendent red then

then the liuer in white whitish.

The substance of the splene consisteth of thicke and much blacke concretioned blood, like the more solid kinde of sponge, and lighter pumice stone, packed together with the frequent Fibres and filaments of vessels. It is therefore rare, and slacke like a sponge, to draw and receive the thicke iuyces from the liuer. And so that cause the small twiggies or Fibres of the vessels (destitute of hollownes) euery where wouen together, are couered with much thicke and feaculent blood, which *Erasistratus* called *Parenchina*, because it is poured forth about the vessels like as in the liuer.

Veynes, Arteries, & Perues vnto the splene are after this sort. The lesser or the least trunk of *Vena Porta*, supported by the inferiour Membran of *Omentum*, tendeth ouerthwartly to the splene, and first offring bzaunches to the posteriour seate of the Ventricle, and the vpper Orifice therof, and to the lower Membran of *Omentum*, as also to Colon where it cometh to the Ventricle, when it hath put forth these, the rest of it deriued first into two bzaunches, and those afterward into others, so that at length in copious order of bzaunchynges, through the lower Membran of *Omentum*, they might be to middle part of the hollow of the splene, after the rectitude of the straight lyne lately spoken of, implanted. But before these bzaunches lose themselves in the substance of the splene, from one of the more notable bzaunches, sekyng into the lower partes of this bowell, a veyne breaketh out, marchyng thence to embrace the lower seate of the Ventricle. Fro the other bzaunches goyng to the splene, sometyme three, sometyme more bzaunches spring, runnyng to the left side of the Ventricle, but not to the vpper Orifice therof ascendyng. And euen as the veynes that come vnto the splene are supported by the inferiour Membran of *Omentum*, so likewise those bzaunches, that from them are deriued to the Ventricle, by the superiour Membran of *Omentum* are sustained.

Arteries also, whiche with such frequented course are directed to the splene, fetch their begynnyng from the Arterie, which bruskyng forth the great Arterie about the region of the reynes, groweth into the inferiour Membran of *Omentum*, and on the left side is especially offered to the splene in equall order with the reynes thereto appertainyng.

Perues to it are begotten from the brach of the vj. payre of the bzaune, which ministrerth to the rotes of the left ribbes, and sendeth a surcle to the lower Membran of *Omentum*, to be sprinkled in the coate of the splene, rather then in the substance therof. Whereouer the splene no lesse then the liuer, is couered with a certaine thinne and simple coate from the Membrans of *Omentum*, that are tyed to the straight lyne of the splene. For these Membrans, beyng inserted to the hollow of the splene, do degenerate into his coate. And because they haue their originall from *Peritonaeum*, by their benefite, and interuenture, we may woorthely say that *Peritonaeum* it selfe offreth a coate to the splene.

But beside the knittynge of this bowell to the backe, and to the Ventricle by the assistance of *Omentum*, small twiggies or Fibres, commyng from *Peritonaeum* where it clotheth the midzeif, are in vncertaine number knit to the boched part of the splene, whereby it cometh to passe that the splene is also bound vnto the midzeif. But *Vesalius* confesseth that these are not alway to be found in man. So sometyme it falleth out that the Gibbous part of the splene is firmissed to the exterior inuolucere of the left kidney (which sloweth with fatnes) by the mediatio of certaine Fibres: But especially if the kidney (as oft it hayneth) be strewed for the most part vnder the splene.

And this is the true description of the splene, ordained of nature to be the receptacle of the grosse & feaculent part of blood confectioned in the liuer. For as the vessel

Substances.

The use of the splene has substance.

Why the substance of the splene is called parenchina.

Veynes.

The beginning of the veynes from the splene to the Ventricle.

Arteries.

Nerves to the Splene.

The coate of the splene.

How the splene is bound to the midzeif.

Cap. 9.

How the splene is sometime tyed to the inuolucere of the kidney.

The office of the splene.

The fift Booke of the

By what the
spleene draweth
his feculent
blood.

The operation of
the spleene.

The vse of the
arteries in the
spleene.

The vse of melan-
choly euomitted to
the ventricule.

Vesal. Cap. x.
The kidneys ij.
in number.

The reason of
their situation.

How the seat for
the kidneys is so
fitly prepared.

Lib. ii. Cap. 9.
Galen in wayne
disputed of the si-
tuation of the
reynes.
In beastes the
right reyne sur-
mounteth the
lefte, but in man
contrariwise.

The contrary
opinions of Vesa-
lius & Columbus
as touching the
situation of the
kidneys.

The author his
indgment between
both.

The reason why
the kidneys must
one of necessitie
be situated higher
then the other.

sicle of choler serueth to sucke away the thynne & lighter fecement, so the spleene to receiue the thicke and melancolite humoz. And this the spleene allureth, and draweth vnto him by the trunk of *Vena porta* commyng vnto him (as is sayd) in sundry braunches.

But this same tyme being drawne, it doth not immediately put forth, but first with great diligence doth labour and confer the same, making it lose & spongyous, apt for his own nourishment, to which thyng are chiefly assistant the off inserted Arteries in the spleene, by their heat highly helping to the exact elaboration of his blood. Neuerthelesse if any part flee from the same elaboration, being vnappt for his nourishment, or to be made equall to his substance, it is euomitted in to the Ventricle to a great purpose and vse, as before in the Ventricle is shewed, *Euchsius* flatly affirmyng that by his solueness he assisteth the holdyng and contractiue functions of the Ventricle: although *Vesalius* in his description of the spleene (seyng the sundry opinions of men) durst affirme nothyng. But *Columbus* doth iterate old *Auicennas* his opinion, notwithstanding *Vesalius* doubtles, and *Euchsius* affirmation.

The reynes, which strayne the blood sent of the liuer into the hollow beyne together with serous and watrish humiditie, which in plenty surmounteth both choler and the feculent blood, are made of nature two in number.

And that moze speedely the serous humoz, which we call vyne, might by them be separated fro the blood, they were both placed so neare vnto the liuer as was possible. For the right kidney in this vpper part toucheth the lower region of the liuer, and the left seateth him selfe so hye, that on some side it lyeth vnder the spleene. Either of them lyeth neare the sides of the bodies of the Vertebres, in the lower regio of the midze, where the same conereth the x.ii. and xij. ribbes, especially in that part where the ribbes are most of all to the posterioir partes oblique and crooked. For that bowyng of the ribbes to the posterioir partes offreth to the reynes a fit seate, whereby they are both safely fenced, as also notably prevented, lest they being towardes the anterior partes, yea but a litle, prominent, should occupy the seate of the other organs of nutrition.

Galen (sayth *Columbus*) vsed much bayne labour, in searchyng out the cause why nature left the right kidney higher then the other, as though the right were situated higher then the left, but his study and reasons therein are fallen together: vntil (sayth hee) yet differ beastes: for then you shall finde him not to haue written rashly: in them the right kidney surmounteth the left, but in man contrary altogether.

Now I know not playnly where to impute the fault, but betwixt ij. so famous Anathomistes, I meane, *Vesalius* and *Columbus*, (the one wryting that where the spleene descendeth lower then the liuer, there the right reyne for the most part to be higher then the left, and contrariwise, the other affirmyng that in man the right is alway lower then the left without any exception) the ignorant Reader, and such perhaps as neuer saw dissection, should rather seme snared in a heape of doubtles, then to passe this point with a cleare resolved mynde. Of *Columbus* I maruell that in all his tyme he had not seene it, els sene, hath not wrytten it. But sure he that diligently shall goethrough his whole worke, shall clearely see that he hath not shot at any thyng with light coniecture, neither set down, which he had not particularly obserued in the body of man: and to him of necessitie (because in my tyme I neuer sawe the right kidney higher then the left) I am constrained to subscribe.

But that the situation of the reynes must needs be one contrary to an other *Vesalius* very elegantly hath remembred. The greatest occasion (sayth he) not being taken of the place wherein they might aptly be seated, but because in opposite order

der they might not draw the serous blood: for so the one fetching it directly to the contrary side, should haue wholly prohibited the office of the other.

In foure the kidneys are long, but lesse broad, and euery where equally thicke. Before and behind they are compressed, and on the out side exactly orbicular or round compassed, and Gibbons: but in the inside, which is shorter then the outside, partly hollow. For in the middle regio of the interior side they haue a hollow deeply impressed, which in the higher and lower part of it maketh a sharpe corner, but in the middle betwene both an extuberant part. In the upper side the reynes be a litle broader then in the neither, as also the exterior side is somewhat thicker then the interior. *Columbus* compareth the kidney to the figure of a litle pulse or grape, called of the Herbarians *Faseoli*.

The reynes are endued with that magnitude or greatnes as might suffice to take away the serous humors vnprofitable to the blood. Their outer face shew as it is smooth, and slippery, so also very red and shining. It is of substance fleshy, thicke, very solid, and hard, and litle varieng from the substance of the hart, saue that it is enterwoven with no Fibres at all. For the substance of the reynes, as also of the liuer and lunges, is destitute of Fibres, onely the Fibres of the vessels poured out into him, seruyng to attraction, retention, and expulsion.

But whe as the whay of blood ought by the reynes to be strayned out, because they might not so fitly grow to the bodies of the hollow veyne and great Arterie, as the liuer it selfe vnto the hollow veyne, therefore notable braunches are brought from the veyne and Arterie vnto them. And from the hollow veyne two great armes are reached, that is to say, ech of them to ether of the reynes, which breake not out one directly agaynst an other, but alway the one higher then the other according to the situation of the reynes, and these are commonly called the Emulgent veynes. The like reason is of the Arteries, which beyng reached out vnder the veynes, are together with the caried ouerthwartly into the bosome or hollow of the reynes, which is fourmed in the inside of them, as lately was declared.

Immediately, and so soone as the veyne and arterie haue come vnto the sayd bosome of the kidney, they are first either of them deuided into ij. braunches, before they make any entrance at all, one braunch offering it selfe to the upper corner of the same hollow, and the other to the neither. And in the same progresse of the vessels into the reines, the arteries very seldome scatter from them selues any braunches, but are wholly spent in the substance of the reynes. Yet from the veyne of the left kidney, the Seminall veyne seeking downe to the left testicle, is sent. And sometyme like the right veyne, springeth a braunche abroad in the fat Membraneous coate of the kidney, which *Vesalius* sayth is to be found, when the left reyne occupieth the higher seate, and that is either alway or most commonly.

Now we will vnfold the way of the vessels, and their distribution throughout the body of the reynes, as also the celses, or cauities in the kidney.

There are therefore in the reynes two cauities, but farre otherwise framed of nature then sondry Philosophers haue supposed. For the veyne & arterie goyng into the body of the kidney do degenerate into one, answerable in hardnes and thicknes to the coates of the Arteries. And this beyng hollow after the maner of a veyne or arterie throughout the body of the kidney distributed. For, first by litle and litle beyng dilated, it is separated after a certaine sort into ij. partes: of which we will call the one the anterior and the other the posterior. The anterior after one order and course produceth now sixe, now seuen, and sometyme also more braunches of equall thicknes, in which this anterior part of the Membraneous body or first cauitie is finished. These present braunches after the anterior part of the kidney, one equally (according to the foure thereof) departing from an other, do hasten towardes the outside of the same, yet not to the outer face of the

As y.

same

The figure of the
kidneys.

Magnitude.

The substance of
reynes.

The use of the
fibres of these
vessels.

Veynes offered to
the kidneys.

Which are the
Emulgent veynes.
Arteries to the
kidneys.

Whence begin-
neth the Seminall
veyne.

Two cauities in
the kidney.

The description of
the distribution of
the veyne and Ar-
terie through the
body of the kidney.

The fift Booke of the

same side, but remaine notwithstanding much inwardly in the body of the kidney: here agayne being dissected into some bzaunches, are connired together with the posteriour bzaunches of the Membranous body. For so, and after the same manner, the posteriour part of the same body like the anterior part is digested into bzaunches, to the outside of the kidney contendaunt.

How the cauitie
in the kidney is
constituted and in
what fashion.

But so soone as these are come hether, where the anteriours are mutually, the anterior with the posteriour, and every one with an others bzaunches do coite, and ioyne together as though they were one body, and constitute a mutuall cauitie. This elegant coiture of the bzaunches is made like halfe a circle, after the fashion of the outside of the reynes.

Moreover this hollow Membranous body, with his bzaunches, hath not euery where the substance of the reynes growyng to it. For the same body before it be seuered into bzaunches, the substance of the reines groweth before, behynd, and on the inside, but not on the outside of it. But the substance of the kidney cleaueth to the anterior bzaunches onely before, and to the posteriour behynd, untill the bzaunches be brought to a mutuall coiture. For where they are denided into many bzaunches, and the anterior do mete and ioyne with the posteriour, there they haue the substance of the reynes to them euery where growyng. Although among those bzaunches, where nothyng groweth to the anterior partes of the kidneye, procedeth a certaine hedge as it were, not growne to the bzaunches, goyng forth fro the substance of the kidney, but groweth vnto them where they mete and ioyne together.

The second cauitie
of cell.

So that here betwene the anterior & posteriour bzaunches of the same Membranous body, appeareth a certaine other cell or cauitie, after a sort parted in ij. For where it respecteth the outer side of the Membranous body, where the same first buddeth forth in bzaunches, it appeareth to be one onely cauitie, but reachyng towardes the exterior partes, after the hedge made from the substance of the kidney, it appeareth ij. For one part thereof is reached betwene that hedge and the anterior bzaunches, and the other betwene the same hedge and the posteriour bzaunches: this cauitie in dissecting appeareth most & altogether without blood. But that Membranous body with all his bzaunches, or the first cell, (if so you thinke good to call that body) is alway found full of blood. And euen as men euery where flow with fatnes, so also haue they here the second cell filled with hard fatnes, and nourished as a serous humoz: which not onely to the dissecters obscureth the speculation of the humaine kidnes, but also hath put so into the heades of some, diligently endeuoryng dissection, as that they haue firmly left witten, this fatnes of the Urinarie way to be a certaine worke made in the reynes to the excretion or excolation of Urine: and therfore to be as a certaine strayner.

Which cauitie
sheweth in dissect-
ing watriness,
which blood.

Fatte in the second
cauitie.

The error of
some Anatho-
mistes.

The beginning of
the vinary way.

Furthermore the begynnyng of the Urinarie passage is from the second cauitie of the kidney, not from the lower seat of the same, but out of the middest of the inside of this second cauitie. For that passage begynneth from the outside of the Membranous body where first it is deuided into bzaunches, then after procedyng through the middest of his body, falleth out of the middest of the reynes into the inside like a certaine beyne. But the serous blood, by the force of the substance of the reynes, & benefite of y^e straight Fibres of his Membranous body, is drawne. Yet do not the reynes take away all. For one part of the humoz is left with the blood, that thereby it might more aptly flow through the cauities of the beynes to the rest of the body. Also it is manifest, that the substance of the reynes doth strayne out that watrish humoz not onely in Vena cava, but also in the great arterie contained: as also what cholericke excrement as yet lyeth mixed therewith, and thrusteth it into the second cauitie, thence to flow through the Urinarie passage to the bladder as a bottell subiected to that humoz.

How the serous
blood is drawne
of the reynes.
The reynes do
not vntirely drawe
the blood of se-
rous humoz, and
why some is still
referred to the
blood.
How the watrish
humoz is con-
uayed from the
reynes.

There

There are besides to the kidneies two coates, varieng both in substance and begynnynge: the first which is outmost groweth not stretely to the body of the kidneies, and yet every where betwappeth the same as an inuolucere. This fetcheth his originall from *Peritoneum* where it compasseth the lower side of *Septum transversum*. This coate is enterwoven with many beynes like as *Omentum*, and so aboundynge with fatnes, thus, after the maner of a coueryng, cherishynge the action of the reynes.

The coates of the kidneies.

Weynes to the first coate of the kidneies.

The coate of the right kidney requireth a branche from the beyne commynge to that kidney, which into the same *Spēyan*, with sundry sortes of branchynge, runeth. The coate of the left taketh a beyne from the left side of *Vena cava*, sprong higher then the beyne of the kidney. Sometime the reason of the rising of the beynes enterwappynge these coates is contrary. The other coate of the kidneies is thinner, and nether set with beynes, nor fatnes, and growne to the substance of the kidneies like as the coate of the liner and spleen. This the thyrd coate of the Arterie commynge to the kidney, & the second of the beyne begetteth. For whilēt these vessels are emplantēd to the kidney, these coates from them departynge, are dilated into this present coate of the Reynes.

The manner and generation of the second coate to the kidneies.

The sinew commynge to the kidney is small in proportion, answerable neither to the arterie nor beyne of the kidney. For they are offred for the cause of nourishment and heate. But for sense sake, nature caused to either of them to be reached one branche from those of the vi. payres, sent to the rates of the ribbes, which rather into the coate then into the body of them is dispersed.

Nerves.

The bladder, which is the receptacle of this watrish superfluitie thereunto from the reynes by litle and litle streyned, and there gathered to a quantitie, seldome, sodainly, and much at once to be annoyed, lest otherwise oftē, or perpetually we should be combred therewith, hath a seate accordyngly appointed of nature, that whensoever it is molested with the quantitie or qualitie of Urine, it might aptly exerce the same: which place was not seemely to be farre from that whereby the dyer excrementes are annoyed. Also the higher seates other more noble organs of nutrition do occupy, so that of very right the bladder, no lesse then the straight gutte, is placed be lowe. What is to say, in the posterioir regio of *Os Pubis*, in the higher part therof sometime more, sometime lesse, accordyng as it is distended by Urine, surmountynge the superioir seate of the same bone. The hinder part of the bladder is excellētly defended by the straight gutte, & *Os sacrum*.

The bladder the receptacle of Urine.

The situation of the bladder.

It is in figure round, but somewhat long withall, & in the highest part, which we properly call the bottome of the bladder, it appeareth larger, which hapneth for situation sake. For although to be more capacious and lesse subiect to iniuries it had bene more conuenient to be round as a globe, nature notwithstanding deuised it longer and more large in the bottome, not that so the same commoditie might be neglected, but lest that *Os pubis* and *Rectum intestinum*, beyng stretched out to the posterioir part of the bladder in men, as is *h* matrice in women, should ouermuch bynde or hold in the distētion therof. Which of necessity had hapned, if the capacite therof, which in lēgth it chuseth, had bene in bredth layd betwene *Os pubis* and *Rectum intestini*. And somuch larger is the bottome then the necke or strete passage beneath, by how much more commodiously it exceding *Os pubis*, may for the Muscles of Abdomen, distend or be dilated. For so it was behoueful, the bladder to be made large and prompt to extēd or stretch forth, whereby more seldome (as is sayd) the Urine might be annoyed.

The fourme or figure of the bladder.

Why the bladder was not made round as a globe.

Furthermore it consisteth of a Membranous and sinewy body, which both aptly can dilate, and also yeld together agayne. It therfore retaineth a light, hard, strong and Membranous coate, whiche sometowhiles is thicker, and sometowhiles thinner, that is to say, when it is either much stretched out, or much bound in: haupng

The substance of the bladder.

The fift Booke of the

Where the bleed-
dar is harder and
thicker.

Figures.

The action of the
bleddar.

Why the coate of
the bleddar is
hard and thicke.

The second coate
of the bleddar.

Whyes and Ar-
teries to the bleed-
dar.

Nerves to the
bleddar.

The vitallie of the
sense to the bleed-
dar.

Col. Lib. 11. cap. 10.
The way carrying
Urine from the
infant as yet in
the wombe.

Ves. libid.
The use of the
Arteries to the
sides of the bleed-
dar.

The insertion of
the vessels bring-
ing Urine into
the bleddar.

The coate of the
vessels bringing
Urine.

hanging this peculiar gift vnto it selfe, that in the highest part of the bottom ther-
of, and where it goeth into a necke, for the emplantation and explantation of cer-
taine passages, it is made harder and thicker.

So coate in all the body (sayth *Vesalius*) more exactly the with the in. fibres
of Fibres then both the bleddar beyng blowed by. For the straight are the inmost,
the transuerse the outmost, and oblique the middlemost: through which the bleed-
dar purchaseth expulsion, retention, and attraction. Hard and thicke ought to be
the coate of the bleddar, because of necessity it must reach forth to so great a
quantitie, as also be subiect to vicerations, stones, sharpnes of Urine, and such
kynde of euils: which vnlesse it were hard, would easely teare, eate through, and
perforate the same.

It hath an other thicke and strong inuolucere given from *Peritoneum*: and this
is called the second coate of the bleddar. This *Peritoneum* offeth vnto it, where
aboue *Os pubis* the bottom of the bleddar and all the Anterior region thereof
cleaueth thereunto. But the posterior side of the bleddar, respectyng the straight
gutte, is smooth, and slippery, annoynted with a watrish humoz.

But lieth the Urine in the bleddar is vnapt for nutrition, nature right
well distributed thereunto beyng, and Arteries, wherewith his heate might be
maintained. And first she hath deriued on both sides of the necke of the bleddar
one beyne, and one Arterie, from the branches of *Cava vena*, and *magna Ar-
teria*, through the hole in *Os pubis* goyng downe to the legge, which, thence as-
cendyng after the length of the body of the bleddar, are walled into a sort of small
twistes and bearelike surcles.

Of Nerves nether is the bleddar destitute. For albeit that Urine, with a cer-
taine familiar substance, no lesse then choler into his proper vessicle, willing-
ly floweth, nether whilst it is naturall is any thing at all iniured thereby: some-
tyme notwithstanding so much cholerike excrement is mixed therewith, where-
by it becommeth so sharpe and biting, that vnlesse the bleddar by sense could
iudge the qualitie of Urine, in retainyng the same long it should be greuously
affected. Therefore amongst the other partes of the body the bleddar obtaineth
not the least Nerves, onely for the sense of touchyng, reached from the branches
of the vi. paype, lent out to the rootes of ribbes, as also from the lower paypes pro-
duced from the spinall mare.

Beside these vessels and Nerves, out of the higher part and middest of the
bottom of the bleddar a way springeth (that is to say, infantes whilst they yet
are in the mothers wombe) called *Urachos*, which goyng forth at the nauell and
through the innermost inuolucere, is the passage whereby the Urine is conuayed
from the child, whiche after it is brought forth to light, serueth no more to any
use, but beyng bound to the nauell susteineth the bleddar.

So also to the sides of the bleddar g. Arteries are attendaunt transpoyntyng to
the infant vitall bzyeth, which afterward, no lesse then the sayd way of Urine, dzy-
by and become vnypositable.

Moreouer into the lower seate of the bleddar, beside the beynges, Nerves, and
arteries, into the hollow thereof two others passages are inserted deducyng Urine
from the reynes, & called *Vreteres*. Nether were they rashly deuised of nature.
For when the reynes (as most behouefull) must be placed neare vnto the liuer,
but contrariwise the bleddar in a lower region: it was necessary that certaine
passages were made whereby to conuay the Urine out of the reynes into the bleed-
dar, & those nature effourmed very like vnto the body of reynes. For they consist
of one simple coate, a litle harder then the coate of the beynges, and enterwoven
with seluer oblique Fibres. For so they are made more apt to beare out iniuries,
and both easie to stretch out, as also to yeld agayne, and the oblique Fibres do no
thyng

thyng hinder, whereby the Urine should not swiftly passe into the bleddar. These are explanted from the second cavitie or cell in the kidneys, leadyng the through the midst of the first cavitie: hence beyng extended to *Peritonaeum* about the Muscles of the loynes, securely craepe downeward to the bleddar. In their progresse they growe to *Peritonaeum*, and by getting from hym certaine Fibres, take on them an other coate, enterwoven with litle veynes and Arteries as is *Peritonaeum*.

These by the way are very litle, anfractuons, or turned. For out of the cavitie of the kidneys they are downeward a litle towarde the inner partes deduced, the better to come unto the bleddar: But lest they should hang, and not firmly be inserted to the bleddar, or should make over crooked a way to it, they are not emplant to the highest part thereof, out of whiche proceedeth the way for the Urine of the infant to the navell, as before is said: but that side of the bleddar, which is nearer to the posterioir region of *Peritonaeum*, to the which these vessels in all their progresse securely grow.

But the region, where first on ech side these pores take hold, is in the posterioir part of the bleddar a litle before the necke, and penetratng the coate of the bleddar that spring from *Peritonaeum* with an oblique anfract or turne, at length pearcing the other coate, do open and enter into the hollow of the bleddar, in like order as the passage of choler is inserted to *Jejunum*: that is to say, with lose or slacke Membrans on both sides, set to the hole of the passages or pores, from the body of the bleddar appendaunt, like as if to the inner coate of the bleddar such thinne Processes there should growe. The vse of these, is answerable to the office of the Membranous Processes growyng to the way that leadeth choler: that is to say, they give place unto the Urine flowyng out of the pores into the bleddar, and whilst the bleddar beyng distended, is wyllyng to regurgitate the same into the wayes agayne, these gathered together, and stuffing the pores, wholly withhold the returne of the Urine. Whiche worke so effectually they bying to passe, as that by them no ayre at all may issue out, notwithstanding that the bleddar be filled with wynde, as Galen abundantly teacheth *Lib. 3. de usu partiu*. And that the same oblique goyng in of the insertion of the pores serveth to the same vse, the blowyng by of the bleddar exquisitely sheweth.

The same experience we daily see in bellowses, for by the hole which is on the backe side ayre is drawne, but when the bellow is compessed, the flappe by force of the wynde beyng pressed to the hole, none at all may returne. The insertion therefore of the Urinarie passages consisteth at the inferiour and posterioir region of the bleddar, not farre from the necke thereof. But here is to be remembered by the way, that certaine heretofore, beyng ignorant altogether of these described Membrans, have neverthelesse had the boldnes to affirme that the Urine was gathered into the bleddar by resudation, or sweatyng through, who here, as in a glasse, may see the futilitie of their subtilt inuention.

Here the lowest part of the bleddar endeth at a narrow issue, whiche we call the necke of the bleddar, otherwise in men then in women put forth, as also in those fastened and growyng to other partes then in these, and to conclude shewyng a diuerse vse in both. First this is common to both, that is, a Muscle lapped round about the necke of the bleddar, which taketh charge that the Urine flow not forth agaynst our will, as abundantly in the Hypochoy of Muscles we haue sayd. So likewise both in men and women the Urine goeth forth by that way, but in men it also serveth to the eiaculation of sperme. Therefore to the necke of the bleddar are given two Glandules called *Parastata*, or *Assistentes*, which receive the vessels bringyng seede, and agayne by great desire in coiture put forth the same by the passage to the extreme end of *Penis*: of which it is at length ei-

Ac. iiii.

culated.

Fibres.

Whence the urinary vessels have the second coate.

By the urinary vessels are not implanted to the bottom of the bleddar.

Jejunum (sayerh Collumbus) but Vesalius sayeth Duodenum.

The vse of the Membrans to the insertions of the Urinarie vessels.

The membrans in the Urinarie vessels compressed to the densse in bellowses.

Col. Loc. Cit. The error of certayne.

The necke of the bleddar. What is the bleddar is common both to man and woman. The vse of the Muscle in the necke of the bleddar. The Glandules called *Parastata* to the bleddar in man.

Col. Loc. Cit.

The fift Booke of the History of Man.

How the ſeede
goeth forth from
thoſe glandules
called paraſtae.

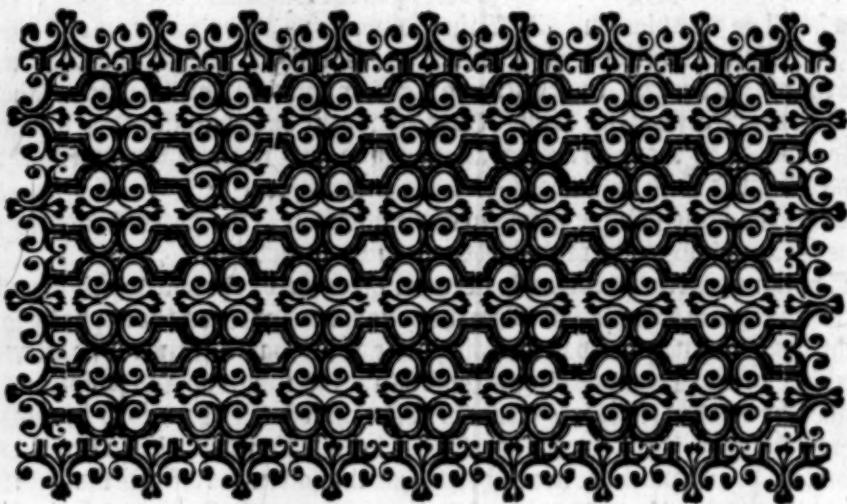
The office of the
bleddar.

The bleddar is
compared to a foun-
taine.
The bleddar in
women wanteth
the glandules
called paraſtae.

culated. For this way of paſſage is common both to Urine and ſeede. How the ſeede from thoſe Glandulous bodies goeth out, is not playne to euery one: for neither is there any open or manifeſt hole thereto, but very many little porie places like as pertaineth to a ſponge: they neuertheleſſe at the firſt ſight not very conſpicious, albeit that by preſſing the Glandules they immediately appeare: for then the ſeede that lurked within appeareth. The vtilitie of the bleddar (leſt I delay the tyme with ouer many wordes) is firſt to receiue the Urine brought vnto it from the reynes by the Urinarie veſſels called Vreteres, then a while to deteyne the ſame, and laſt of all to a- uoyde it. So maruell therfore if to a fountaine it be compared. In women it cleaueth to the matrice, wantyng the Glandules called *Paraſtae*.

*An end of the Hiftorie of Natu-
rall and nutritiue partes.*

¶ Of



¶ Of the History of Man, the vj. Booke of
the instrumentes seruyng to the propaga-
tion of mankynd. That is to say,

85.

The generative partes.



When Nature, through occasion of the matter, was de-
nyed the immortallitie of man, as *Gal. Lib. 1. de reuend.*
sant. Cap. 1. plenteously teacheth, notwithstanding, to
the consecration of humane kynde, euen from the be-
gynning, the almighty creator made ii. men: the Male,
to reach out the effectuall begynnyng of generation:
the Female, aptly to conceiue the same, and to nour-
rish the infant begotten of that matter. To the which
giftes, both the man, and the woman obtaine fit, and
peculiar instrumentes. What they be, and how they

Vesal. Lib. 5. cap. 22

The cause of the
creation of both
kynnes.

The generative
partes of the Fe-
male are omitted

The Testicles.
Number.
Figure.

Substance.

Galen.
De.

The coates of the
testicles.

Col. Lib. 12. cap. 14.

Col. Loc. cit.

Cuticula.

Cutis.

Membrana carnea.
In the purse of
the testicles is no
fatte betwene Cu-
tis, and Membra-
na carnea, and
why.

Vesal. Loc. Cit.

The proper
Membranes of
the testicles.

The descriptio of
the outer coate.
Whence the first
coat of the testi-
cles springeth.
The outside of
the first coat how
it is.

serue, so farre as from the begynnyng my purpose hath intended, that is to say,
asmuch as of the Male may commodiously be spokē (for moze I thought not good
to translate into English) shall now specially be declared.

The Testicles therfore, which first we will opē, are situated so, as is euident to
each mans sight. They are two in number, round, but there withall somewhat
long: a litle blunter, and larger below, then in the superiour part, although be-
ry obscure to be iudged. On the outside of the testicles is no maner of canitie, im-
pression, or inequality. They consist of white, milkie, and soft substance, euery
where alike, and continuall: saue that it is filled with very many, and most small
beynes, whereby it seemeth light, and hollow, as is the substance of the splene.
But they are hollow, as also *Galen* witnesseth *Lib. 14. de vs. part. cap. 10.* that
the matter, taken in the vessels to be coccoed, they after receiuyng, might labour
it agayne, to make it moze perfect, boater, and fit for generation.

The Testicles are covered with many coates: some common to both, and o-
thers peculiarly enwrapping either of them.

As touchyng which coates, or inuolucres (whether I terme them it for ceth
not) great strife, and controuersie, I may not say confusion, is found amōge the
Anatomistes, chauncing either through want of skill, or els negligence, or both.

Neuerthelesse, I haue determined to set downe the opinions of the best, and,
as playnly as I can, wherein they disagree, suspending myne owne iudgement,
for obscuryng the light to the Reader. Therfore, in haupng befoze your eyes, to
dissect *Scrotum*, for the sight, and administration of the Testicles, first appeareth
Cuticula, the *Cutis*, which, in this place, is most thinne, and wrinkled, next *Mem-*
brana carnea, betwene which, and *Cutis*, is not fat, lest it should not extend, and
contract, reach forth, and wrinkle together, as it now doth.

Proper Membranes to the Testicles are numbred two, whiche particularly
enwrap either of them, in largenes, makyng, and thinnes, one varyng from an
other. For the exterior, or outmost clothe the Testicle, and his vessels, euen
vnto that part, where they are committed to the large scope of *Peritoneum*, beyng
strong, thinn, and aboundyng with beynes. For where the seminall beyne, and
arterie, as also the vessell carryng seede vpward, are brought forth of the great
scope, or amplitude of *Peritoneum*, into the regio of the flanke, and into the purse
or codde, thence *Peritoneum* educeth this present inuolucure, which worthely is
to be called a part, or Processe of *Peritoneum*: for so it is produced from *Perito-*
neum, as the codde from the skynne. This coate, on the outside, where *Membra-*
na carnea toucheth it, is thereto growne, by certaine Membranous Fibres.

Lib. i.

More

The sixte Booke of the

The inside of the first coate how it is.

What the first coate of the testicles hath common with Membrana carnea.

The vse of the first coate of the testicle.

Why the first coate is called Erithroides.

The situation of the second coate of the testicles. Wherto the vessels do growe.

Where are inserted the vessels carrying seede.

The name of the second coate of the testicles. Epididimos. Col. Lib. 11. Cap. 14. The coates to the testicles after Columbus and which which is Epididimos.

The third coate of the testicles. Epididimos is not the folding of the vessels.

Vesal. Loc. cit. The veyne to the right Testicle.

The veyne of the left testicle.

Now couer on what side the coate of the right testicle toucheth the coate of the left, by Fibres likewise both the coates are committed mutually together: so that the outside seemeth not very smooth, but rough, by meanes of the Fibrous growng together of the Membranes. But the inside, or interiour part of this coate, where it respecteth the Testicle, & his vessels, is smooth, & with a watrish humour annoynted.

Furthermore this coate obtaineth somethyng common with the fleshy Membrana of the body. For as that, in some part, is increased, and enterwoven with certaine fleshy Fibres, and thereby degenerateth into the nature of a Muscled, such so this coate of the Testicle, after the whole length thereof, in the posteriour part, obtaineth from Peritonaeum, downe to the lowest part of the Testicle, fleshy Fibres, and sheweth the nature of a certaine strict, and long Muscled, which to the same coate, or Membran is fastened: no where departing from it, but, beginning with it from Peritonaeum, is also, together with the coate, growne to the inferiour part of the vessel, that carrieth seede from the Testicle.

This coate, besides that it fitly couereth the Testicle, and holdeth it suspended, by the benefite of that Muscled, draweth upward the Testicle, as with a certaine voluntarie mowng. By occasion of this Muscled, that is to say, because it is red, as the rest of the flesh, that coate is called Erithroides.

The second, is vnder this, and nearer to the Testicle, by the meanes, and interuention wherof, the vessels, to be committed to the Testicle, do grow there to. For there this coate is slacke, thinner, and softer, where the vessels are fastened to it, then the whole compasse els. For to the higher part of this coate, a veyne, and arterie, bringng blood and spirite to the Testicle, do growe: and there also many branches, perforatng this same coate, do make incurse into the substance of the Testicle. In the posteriour part, this coate, all after the length thereof, hath strongly growne to it, all the foldes of the vessels carrying seede, coueryng the Testicle, there also being broken into, with many holes not easie to be sene. Each where els, on the outside, it is smooth, washed ouer with a watrish humour, and knit wholly to no part: on the inside, it groweth euery where to the substance of the Testicle. This coate, with the auncient Grækes, is called Dartos. The first professors of Anathomie, which named the Testicles Didymoi, haue called it (sayth Vesalius) Epididimos.

Columbus not onely not subscribeth hereto, that is to say, that this Epididimos, and next of all engloseth the substance of the Testicle, but sayth flatly, there be iii. proper coates to the Testicle, how soener Vesalius sought them, as Erithroides, Dartos (which two are now lately described) and Epididimos: which Epididimos, he alloweth not to be the auncient name of Dartos, but of the thyrd tunicle, which doth immediatly bewrappe the substance of the testicle: being white in colour, and in making thicke, that it might playne appeare, those to haue erred, which called Epididimos that folding together of the vessels, that appeareth aboue the Testicle.

Neither of the Testicles, singular veynes, and arteries are brought, one differing from an other in beginning: for the veyne commyng to the right testicle, fetcheth his beginning from the trunk of Vena cava, lower then the goyng forth of those veynes that are reached to the kidneys, yet goeth not forth at the right side of the same stocke, but out of the superiour, and fore part thereof, a litle to the right side declining, and by litle, & litle, reached oblique towardes the right side, and stayed by Peritonaeum, is caried downward. The veyne of the left Testicle, doth not how his beginning from the stocke of Vena cava, but, springng forth much higher then the right, breaketh out of the lower seat of the left Emulgent veyne. Sundry Anathomistes heretofore, seying such diuersitie in the structure of these veynes, imagined, that the left seminall veyne, was so begon from the

the Emulgent; for that it was necessary, that a false humour were carried to the Testicles, by the long trickling tubef of, by the way, to supplye up, in the tyme of coition, such great delectation.

Collumbus (notwithstanding) confuteth wholly this opinion, in these wordes: I haue knowne many, who, hauing lost their left Testicle, is become whole of that kinde of rupture called *Intestinalis*; haue confessed, and shewd vnto me diligently enquiring, that, in the same act they enjoyed the like pleasure; as before tyme they had found.

Some Anatomistes therefore, haue not knowne how to discourse this case, I meane, for the unlike exorture of the seminaall veynes: others haue omitted to speake thereof: but *Collumbus* (as his custome is) enuicorping to cure the doubtfull myndes, hath excogitated a proper reason; and that beareth like likelihood of truth. These are his wordes: for asmuch as these seminaall veynes are very slender, and lile, and that the great arterie is situated so neare to *Vena cava*, on the left side, which arterie neuer in liuing bodies, ceaseth to move, great, and euident danger was eminent, that this slender veyne, in those continuall moynges, should be broken. Which prudent nature waying, to winne such incertainty, willed that the left seminaall veyne, might fro the Emulgent be fetched, not from the trunk of *Vena cava*: least in descende it should lye vpon the great arterie.

These seminaall veynes, in this order goyng downeward, are committed to *Peritonaeum*, by Fibrous knittings, which, in degeneratyng, make the another roate. And to either of these veynes, the felowship of an arterie is committed: for the begynnynge of both the arteries, is lower then of the veyne goyng to the right Testicle: they are taken forth in the middest of the anterior part of the great arterie, one directly agaynst an other, and neare themselves, and the right crossing obliquely over the trunk of *Vena cava*, so descendeth, and hastneth downwarde to the veyne of the right Testicle. The left comyng to the veyne on his side is sometyne wantyng (sayth *Vesalius*) and, for that, the veyne of the left testicle is larger farre then of custome: But to spring out of the arterie of the left kidney, is scarce at any tyme sene: although, to chaunce sometyne, it is not impossible.

The right veyne, and arterie (the like is to be vnderstande of the vessels on the left side) beyng together, after a space, so contingent, and mutually growyng together, as that most elegantly this word of the Grecians *Anastomosis* may be to them applyed (although the like may be sene also in sundry veynes, and arteries in the body, and chiefly in the armes, & legges) they lye to *Peritonaeum*, tyed, with Fibrous or Membranous knittynge, and, in bended sort, reachyng downe the right side, are caried aboue that passage, which bringeth Urine from the right kidney to the bladder: in their progresse, pouryng out very small twistes, and slender surcles, to *Peritonaeum*: but so sone as these vessels are come to that part of *Opubis*, whereas the vii. of the Muscles, moyng the thigh, is caried, aboue the huckbone, downewardes toward the lesser or inner Procèsse of the thigh; there (I say) those vessels, neare to *Peritonaeum*, do pearse through the side of the same Muscle, so, slipping forth of the large scope, or amplitude of *Peritonaeum*, fall downe to the peculiar roate of the Testicle, together with a litle Serue, produced sometyne from a brannch of the vy payze of sinewes of the brayne, lent out among the rotes of the ribbes; but other whiles from the xii. payzes of the Serues of the Spynall marey.

Whereouer the hole of *Peritonaeum*, that thus transmitteth the vessels, with the Serue, is not so euident, as if one should put a penne in the mouth, or strike it through a paper; but *Peritonaeum* most exactly groweth to the sides of the vessels, and to that roate, which it reached vnto them, in the progresse, bringyng as yet with in the copasse or scope therof, safely sendyng them, no otherwise, then as *Septum*

Bb.ij.

trans-

Col. Loc. Cit.
The opinion of
some Anatom-
istes as tou-
ching the begi-
ning of the left
Seminaall veyne.
The confirmation
of that opinion.

The recto cause
why the left Semi-
naall veyne begin-
neth at the left
Emulgent.

The beginning of
the seminaall ar-
teries.

The beginning of
the right Artery.
Loc. Cit. The left.

The progresse of
the right veyne
and Artery after
they touch toge-
ther.

Col. Loc. Cit.
Vesalius.

The hole through
which the vessels
pass out of Abdo-
men, and into the
testicles.

The sixte Booke of the

transuersum, and the *Spembzans* wherewith it is clothed, do offer way to the stomach, and hollow beyne. But so soon as these vessels haue passed the hole of *Peritonaeum*, they are led from the right side, after a certaine sort, agayne obliquely done towards the left, so brought to the vpper part of the right testicle; in this last descense, one with an other mutually myng as aforesaid; and effourmyng one body like a pillar depressed before, and behynd, whose cress, the first meeting, and myng together of the vessels make. But the foundation is that part, wherby they are committed to the vpper part of the Testicle.

About this body ten thousand bzaunches confusedly are packed; nether all of them directly procedyng downward, but some partly straight, partly round compassing, partly ouerthwart, others appeare folded in other order together: and it is impossible to follow one maner or order of their tracynge.

Whylest so many enfoldynges of bzaunches are made in that *Spembzan*, which *Peritonaeum* offretb there to the vessels, wherby they cleaue vnto it with Fibrous knittynge, that body seemeth to represent the skynne in the calfe of the legge of some rusticke, or labouryng person, which is newly swelled, with the tumors called *Varices*. For as therein we may perceiue the beynes, diuersly, and altogether vnequally, with straying traces, in abundant sort to wander: so likewise in this body of the seminnall beyne, and arterie, innumerable bzaunches are scattered. For the which similitude certainly the auncient Anathomistes haue called this body *xipionides* *napasaryns*, as one should say, a swelled body to the Testicles adiuuant. This, in the seate, or foundation therof, groweth to the vpper part of the inner coate of the Testicle, which we haue sayd to be called *indidymos*; and distributeth also many bzaunches, straight pearcing this coate, to the vpper part of the Testicle, many wayes among the substance of the Testicle, like as the beynes of the liner, into the substance therof disseminated, consistyng of a very thinne coate. This is the order of the seminnall beynes, and arteries, whiche also are named *Vasa preparantia*.

So that mutually foldyng of the vessels together, by a maruailous arte was deuised: for thereby it is brought to passe, that the same matter of seede, whiche first is red, should begin by litle and litle to be prepared, altered, and made white. By which elaboration begon, no doubt, a great part of labour to the Testicles is diminished: which wholly had belonged vnto them, had not the foldyng together of the vessels, ministered vnto them helpe, as more hereafter.

At the outside of this same *Varicosum corpus*, where it is to the Testicle ap- planted, an other white and hard body, after the maner of a harder sort of sinewes, groweth to the inner coate of the Testicle, and thence begynneth. This on the outside where it is not committed to the Testicle, is Gibbous, and round after a sort: but on that side it groweth to the tunicle it selfe, it is hollow, accordyng to the conuered shape of the Testicle. This body is caried, from the outside of *Varicosum corpus* to the hinder part thereof, and done by litle and litle creppng towards the interiour partes, after the posterioir region of the Testicle, groweth fast to the inner coate therof, so long, vntill it haue descended to the lower seate of the Testicle, whence forthwith it is vpwordes reflected, stretchyng forth, and lyng to the inner coate of the Testicle, but not any more growyng to it, nether reteynyng the same source. For all the way whereas that body is knit to the coate of the testicle, it is almost of equall thicknes, and alike figure, which to the redzell of a vine, or gourd, which windeth or turneth thicke about any thyng, may be assimilated.

Although (notwithstanding) it turneth not about, or in round compassed wyndynges, as both the redzell, but as it were from side to side: like which resolitions, a snake, or ele in creppng maketh. For the turnynges, anfractes, or inuolutions

Circoides parastetes.

Epididymos.

The Seminnall beynes and Arteries are called Vasa preparantia.

Col. Loc. cit. The vse of the foldyng and wyndyng of the Seminnall vessels.

Vesal. Loc. cit. The history of the vessel bringyng seede from the testicle to the necke of the bladder. It is not meant round euery way as a globe but long, and thence with round as a staffe.

where the tempest of the vine, or creepyng of a snake is compared to the wyndyng vessel.

tions of this body, are very continuall, and together growyng.

After this sort therefore, that body groweth to the inner coate of the Testicle, and is on the outside, the impressions of those insolutions being taken away, smooth, but on the inside, being with a sharper instrument remoued, from the inner coate of the Testicle, rough, yet pearled with no wayes, or pores, that may be sene. Neither is it sene otherwise hollow, not onely where it groweth to the coate of the Testicle, but nether also where, from it departyng, it is carryed by-wardes. For as soon as it hath descended downe to the inferiour part of the Testicle, in the straight reflexion thereof by agayne, it is made, by litle and litle, narrower, & rounder, no more breasted, but endeth as at a round sinew. And that chiefly in deede it doth, whereas, by clymping byward, it surmounteth the upper part of the Testicle. Whether so soon as it is comme, it is layde to the fore part of the same *Varicosum corpus*, towards the inside, to which, by the inter-menture of a thynne Membran being knit, it proceedeth somewhat higher, and is therterto returned, whereas *Vasa preparantia* came forth, entryng through the same hole, which is made in the Tendons of the ascendent, descendent, & oblique Muscles of the belly.

But immediately after it is come into the capacite of the bellye, it boweth downeward, neare *Os pubis*, and under the bleedbar, where, more and more it is amplified, and agayne neare the endes, much enfolded and wrythen, untill at length it is implanted among the Glandules called *Parastata*, which, about the roote of *Penis*, and borders of the bleedbar, are placed. This description is to be applyed either to the right, or left of the vessels *Deferentia*, for so both of them, after one prescript order, begyn, & go forthward under the bleedbar, above the straight gutte, and at the same Glandule, mutually meetyng, do ioyne together, constitutynge one body, In which their folde, wrythes, obvolutions, and Glandules, so much siede is conteined, as might suffice to the generation of thre or foure children, especially in frutefull bodies.

Wherfore let it be no maruell to vs, which Aristotle propoundeth, as a thyng to be wondred at, in that a Bull did engender, notwithstanding that his Testicles had bene cutte of. As therefore the other foure before described, are called commonly *Vasa preparantia*, as vessels first preparyng the matter of sperme, so these two last spoken of, are called *Deferentia*, as we should say, bringyng the the siede. For in deede they receiuyng the same at the substance of the Testicles, do bring it to the yard. The insertion of this kynde of vessel in the yard is not easie to be sene, and is opened onely in tyme of coiture, and excretion of siede.

At the Glandulous body, in which the vessels *Deferentia*, after their meetyng together, are inserted, which also they call *Glandula Parastata*, as is lately sayd, is repored in the lower part of the bleedbar, in the midst after a sort, betwene the body of the bleedbar, and necke thereof. It is one body, and moreouer greater then the Testicles them selues, albeit not exactly round: for before, & behynd it is depressed, but on the sides, round as a bowle. Through the midst thereof the conduit of the bleedbar proceedeth, which is, in this place somewhat more large, and ample, then in the rest of the progresse: but not pearled through, of the vessels bringyng siede, that manifestly can be sene, but onely rough, unequal, and wrinkled, chiefly in the posterioir part, where the goyng in of the bringyng vessels, sometyne to the diligent dissecters, are playnly apparaunt.

Now it resteth to expresse the vles of these singular described partes. It is euident to all men, that the substance of the Testicles, by a peculiar facultie begotten to them selues, doth make siede of that matter, which the veynes, and Arteries bring, and carie throughout the Testicle, as doe the veynes, through the liuer, the blood. But the best portion of the blood, and spirite, the

Ab. ii.

through

Col. loc. cit.

The progresse of the bringyng vessels, after they are come into the capacite of the belly.

Vesal. loc. cit. Where the bringyng vessels doe meete, and ioyne together.

Col. Ibid. What siede is conteined in the Glandules and folde of the vessels.

It is no wonder which Aristotle made of the bull that begyns and wanes his testicles. Wherby the Arist. iiij. are called *Vasa preparantia*. Wherby these ij. are called *Vasa deferentia*.

Vesal. Ibid. The insertion of the bringyng vessels to the yard. The situation of the Glandulous body called *Parastata Glandula*. The magnitude and figure of the Glandules *parastata*.

The use of the substance of the testicles.

The sixte Booke of the

veynes, and arteries of the Testicles do carry, with a long and tedious progress, wretched with innumerable revolutions, to the perfect preparation of matter, for the making of seede. Neither is that same brought into any one large tun- tie, made in the Testicles to receive it, but is distributed into most small vessels, made of the same so thinne a coate, dispersed through out the substance of the Testicle. And like as is sayd of the substaunce of the liver, (so likewise the sub- stance of the Testicle, by his insited sacculle, addeth unto the blood, and spirite, contained in his vessels, the perfect nature of seede. And this force, in men, is the cause of strength and manhode, and in women (if so we may say) of womanhode.

How the seede is
sent out of the
testicles into the
bringing vessels.

Furthermore the seede prepared of the Testicles, innumerable (though ve- ry small) porie wayes do reach into the folde of the bringing vessell, growing to the Testicle, thence agayne, out of both the Testicles, carrying seede to be e- iaculated, and cast forth into the matrice. But the bringing vessell is, above the Testicle, withen with so many turnes, and windynges to the end, that sooner, and in more copious sort, it might receive seede from the Testicles, as also that the seede from it might likewise obtaine some elaboration. But the implanta- tion of this vessell to the testicle, with most strete, and small holes, is brought to passe by the interuenture of the inner coate of the Testicle: because the vessell is hard, strong, and thicke, for so it was requisite, to beare out iniuries, but contra- riwise, the substance of the Testicle to be slacke, and soft. So that prudent na- ture either here, or els where, hath not ioyned in one, those which in essence were contraries, except onely by the means of some indifferent substance, put as a mediatour, of frendshipp and amitie betwixt them. In how much therfore, the inner coate of the Testicle is, in hardnes, inferior to the vessell bringing seede: therein, the same coate, by so much agayne surmounteth the Testicles: although not round about, but onely in that place, where the seminarie vessels grow to it. For here it is softer then any where els, and pearced through with small holes, as is sayd.

How the bring-
ing vessel grow-
eth to the testicle

Two contraries
are ioyned no
where without
the means of some
indifferent sub-
stance.

Neither doth this vessell growe to the Anterior, but posterior part of the Testicle, that now, whilst it may reach, or containe the consecreted seede, for the Testicle alone doth consecret it, it might be reposed in a safer place, using the Te- sticle in place of a propugnacle. And by the same reason, when the vessell en- treth into Peritonaeum, under the Veyne and Arterie it is doothely hidde, that it might containe seede, with blood, and spirite, of which the seede is more per- fectly prepared.

Where the seede
is more perfectly
perfected.

Finally, the right vessell doth coite and ioine with the left, and so both into the necke of the bleddar are insinuated, that, at once, the seede of both the Te- sticles might be projected and cast into the wombe. The vse of the Glandu- lous body is to moflen the way of Urine, and seede, and to be as an underfet, or proppe, like as of the wayes digested through it from the bringing vessels, so al- so of the Veynes, Arteries, and Serues, distributed to the body and necke of the bleddar: yea, and peradventure may seme to adde unto the seede a certaine per- fection, and to be expedient for the generation thereof, sayth Vesalius.

The vse of the
glandulous body.

Loc. cit.

But besides, unto man, for the apt acte of generation, the omnipotent maker hath given a member (called in Latin *Coleus penis*, *mentula*, *virga*, or *Puden- da virile*, in English the yard) most fit for the effusion of seede into the wombe: which in the tyme of carnall societie, ought to be swelled, stiffe, and erected, but so to remayne at all other tymes, it should become vnapt to vse, and easily iniu- ried, no otherwise, then if the hand should alway be boyne ertended.

Vesal. Li. 4. cap. 18.
The yard and the
office of that
member.
Why the yard is
not alway disten-
ded.

When as therfore it was behofull, that sometyme it should be slacke, ten- der, and short, and at other tymes extended, and swelled, it seemed expedient that the yard were made of two bodies, large and hollow within as a sponge, which should

The construction
of the yard, and
how it is erected.

should, being filled with spirite, be erected, produced, and notably swelled, but the same spirite once dissolued, they incontinent become slacke, narrow together, fagde, and shorter.

The figure, and situation thereof to all is well knowne, but the substance to very fewe, although most worthy to be knowne not consistyng in vulgar speculation. For in man, the substance of the yarde is not bony like as in a Wolfe, Fore, or Dogge: for in vs if it should haue bene so, it must needes haue bene continually stiffe, and hard as a stick, which in sundry causes must needes haue bene an impediment vnto vs.

Neither is it Cartilaginous, nor of a Ligamentall substance, nor Muscular, nor sinewy, neither a Veyne, Arterie, nor Membran. Although of these, some appertaine to the makynge thereof. But none of these, taken alone, was applied to the makynge of the yarde. Neither could they haue shewed, for what cause, parent Nature had begotten the same.

For it was not onely done for the emission of Urine, but to ejaculate seede into the matrice, for procreation sake. For this cause (as also is sayd before) in man, the yarde was made of a certaine substance, which may either be erected, or enfeebled, made stiffe, or bendyng.

It is therefore (I say) of very right spongyous, rare, and porie, almost like the substance of the Spleene, albeit Nature hath endew'd it with thicke Ligamentes, which together with the rare substance of the yarde, take their begynnyng from the inferiour part of *Os pubis* (not from the superiour, as Galen supposed:) and hauyng in the fundament a fleshy begynnynge, stretcheth forthwith towardes the upper partes, but about the middelt of *Os pubis*, the right begynnynge with the left, is vnited, and ioyneth together: then being inflected downward, are implanted to the borders of Glans, whiche Glans is harder then the other partes of the yarde. The right Ligament, with the left, after the length of the yarde, is vnited.

But because the substance of the yarde, did then consist but of a rare, and porie ioynynge, or settynge together, and for that it could be litle apt to the necessary erection in coiture, (since scarce sufficient helpe was purchased by the onely benefite of the Ligamentes:) prouident Nature poured forth two Arteries, through these also sayd bodies, which are, from the roote of the yarde, carped euen to the extreme end of Glans, but so, as that by the way almost an infinite number of branches are disperfed. When lust therefore styreth to the generation of a new man, she poureth forth great force of spirites throughout those Arteries, & hearie branchynges, by whose helpe, the same substance before, wrinkled, weake, and bendyng, is now lifted vp, erected, made stiffe, and hardened. But the Ligamentes also sayd, do as it were propper and vnderfet the same, being of them selues thicke, both for this sayd cause, as also least the spirites should ouer hastily vanish away, being wasted. These Arteries, and their offices, *Columbus* boasteth no man before hym to haue rightly knowne: by whiche also (sayth he) nourishment is brought vnto the yarde, whilest elles, in the yarde is no Veyne, nor any Perue, notwithstanding that *Vesalius* is of cleane contrary opinion.

Beside these partes hether to decided, which Nature deuised for the framynge of this instrument, there are also foure Muscles, which in the second booke of this History, are sufficiently spoken of.

There is besides, that common way, or passage, destined both to seede and Urine, which, vnder these two bodies, is conuayed, neither is it any thyng els (sayth *Columbus*) if it be rightly wayed, saue the substance of the bleedar lengthened out to the end of the yarde.

Col. Li. ii. Cap. 19.
Figure.
Simarion.

The substance
of the yarde.
Why the substance
of the yarde is not
stiffe.

The vse of the
yarde.

Glans is the
head of the yarde,
the thinnest ouer
which is called
preputium.

The arteries to
the yarde.

How the true
erection of the
yarde happeneth.

The vse of the
Ligamentes of
the yarde.

In the yarde is
neither veyne,
nor nerue.
Loc. citat.

Muscles to the
yarde.
Col. Loc. Cit.
The passage com-
mon to seede and
urine.

Of what the com-
mon passage com-
meth.

The sixte Booke of the History of Man.

Why there groweth no fatte vnder the skynne of the yarde.

What is Præputium.

The Hebrewes lache præputium.

Vesal. Loc. cit. Sutura.

Perizon.

Why the partes of women are not here spoken of.

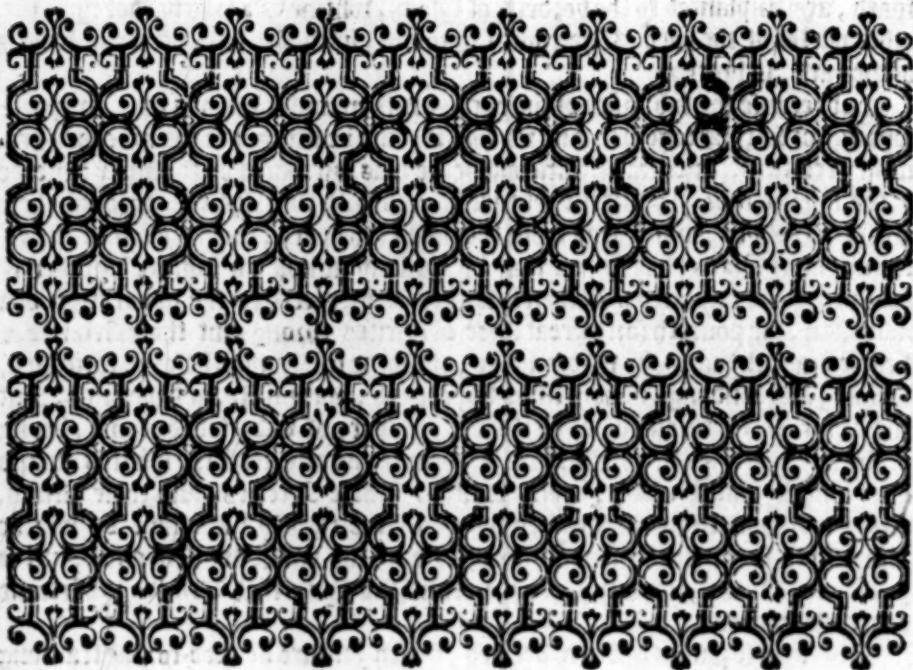
All these are covered ouer, and clothed with *Cuticula*, *Cutis*, and *Carnes Almembrana*, without fatnes altogether: which here for motion sake is wantynge, lest supernaturally therewith encreasing, it might be greuous to the matrice.

The extreme part of the yarde is called *Præputium*: beyng that skynne wherewith Glans is covered, so, in the acte of venerie, notw bpward, notw bolowward, to the exceddyng delectation of the Female, moued: this is that, whiche the Hebrewes, in tyme of Circumcision, lose. The lyne vnder the yarde, marchyng after the length therof, is called in Latin *Sutura*, for so it representeth the fashon of a seame. As the part betwene the innolucere of the Testicles, or purpose of the stones, and the fundament, is called *aspidochy*, That is *Interfeminium*.

But because I am from the begynnyng perswaded, that, by listyng by the bayle of *Natures secretes*, in womens shapen, I shall commit moze indecencie agaynst the office of *Decorum*, then yeld needefull instruction to the profite of the common sort, I do here ordaine the vij. rest of these my labours.

An ende of the Historie of the
Generatiue partes.

90f



The Vitall or Spirituall partes.



Before you all whosoever you are (most atten-
tive Readers) I freely protest, that hether to
my penne hath not wauered in the doubtfull
balaunce of ambiguitie, but passed the playne
pathe of truth, guided by the footelcippes of
my sozerunners: till now at length, beyng
come to a place somewhat ascendyng (as they
that will attayne to the scope of their desire,
must not refuse the hill with the dale) I finde
the steppes of some willingly yeldyng to so te-
dious a iourney: others, with senses unappal-
led, to haue plowed a path directly over the
mountaine: here I see one willingly walking a

contrary way: and there an other, prayng their endeouours, but protestyng him
selfe onely to haue light in the nearest way. So that here, no maruell, though
I should stand amased, and as one plunged in the depth of contrary streames.

For Galen, Vesalius & diuers others, as touchyng the instrumentes that restore
the ayrie substance, whiche continually waste, and refresh the innated beate,
are contented to affirme, that, of the ayre drawen in by the lunges, part is recei-
ued by the furcles and braunches of the veniall Arterie, and there hence, beyng
prepared by the elaboration of the lunges, is by the same vessell caried into the
left ventricle of the hart, where, metyng with the blood lately strayned throug
the hedge betwene the ij. ventricles, it doth together by the workyng of the hart,
ordaine that famous composition, the vitall spirite.

The opinion of
Galen and Vesalius
how blood come-
meth into the left
Ventricle of the
hart.

Contrariwise Realdus Columbus sayth, that the blood, sent from the right
ventricle of the hart, by the arteriall Veyne, into the lunges, there takyng the
mixture of ayre, is drawne, by the veniall arterie, into the left ventricle of the
hart, whereas, beyng almost made before, it is now perfected vitall spirite.

The opinion of
Columbus.

Albeit I am not ignozant, how lately, both these assertions are denyed: Leo-
nardus Botallus prouyng that blood is brought into the left Ventricle an other
way, that is, by a proper Veyne that is found somewhat about the cozonall
Veyne, neare adioyning to the right auricle, thence with direct tract marchyng
to the left: which contrarietie notwithstanding (lest I should seeme to confound
the History of the vital members:) I haue thought good to describe the partes af-
ter the best approued, and that in such wise, as there shall appeare therein great
perspicuitie, and likehode of truth. Yet not that I meane to reiect Botallus,
although he hath neither distinctly set downe the derimation of that Veyne, nei-
ther apertly the insertion therof, but because the labour of him shalbe lesse, that
endeuoureth, alone, to stoppe the runnyng streame, accomplyng any duety
done (right curious Reader) in describing the partes, to haue forewarned thee of
this late inuention.

Leonardus Botal-
lus.

To the which description that I may briefly come, I will omit further circū-
stances: onely to do away obscuritie, I meane, that the whole be not maymed, by
wantyng part, it behoueth to begyn at the pannicle coueryng the ribbes, & thence
to the other partes, contained within the capacite of the brest.

The coats therefore of Membran to all the ribbes (beside the ris. on each side
occupied with the implantation of the mizer) and to the whole brest bone

Vesal. lib. 6. cap. 2.
Of the Pannicle sub
160 Pleura.

C. i.

Ende,

The seventh Booke of the

underreached, and coueryng the bodyes of the Vertebres of the brest; and the upper part of the midzeif, towardes the amplitude of the brest, is named in Latin *Succingens*, and commonly called *Pleura*,

In the posteriour part it toucheth along from the first Vertebre of the brest, downe to the xi. out of which region, consisteth that part of the midzeif, that transmitteth the great arterie, but in the forepart, it descendeth from the cannell bone, to the lower part of the brest bone, whereto the midzeif groweth. In the sides as gayne, from the first ribbe, to the upper face of the midzeif, which respecteth the cauitie of the brest, thus clothynge it, and also the whole amplitude of the brest.

The figure of
Pleura.

This coate, like as the cauitie of the brest, in figure varyeth very much. For in the upper part, accordyng to the brest, it is streit ended as it were pointed, in the lower part broader then above, but in the sides of the brest broader then in the inferiour part. For ever in the fore part it is much shorter then behynd, by reason of the obliquely situation of the midzeif. It toucheth from the poynte of the brest bone, to the xi. Vertebre of the brest. Also in the fore part, and in the sides, outwardly, enen like to the brest it selfe, it is in figure Gibbons, or bunched forth: but in the posteriour part, longwise, as it were to the amplifying, and enlarging therof, it obtaineth an inward impression, after the order of *Peritonaeum*. For the bodyes of the Vertebres are apparaunt, or prominent into the cauitie of the brest, like as the rootes of the ribbes, which are somewhat reflected back wardes from the bodyes of the Vertebres, untill, forthwith procedyng towardes the anterior partes, they are downwardes oblique. This Membran inwardly is (for the most part) smooth, and as with a watry humo, ouernoynted. Besides, where it reacheth forth certaine Membranous Processes, by which it either yeldeth out other Membrans, or gathereth some peculiar body unto it.

Fatte.

Sometyme there is found, although very seloome, a harder kinde of fat in the inside of this coate, no otherwise then to *Peritonaeum*, and that especially, where it is nearer to the Vertebres, and where the chiefest veynes therof are guided.

The tying of the
luniges and pericardium to Pleura.

For ever here, and there, on both sides, it putteth forth Membranous Fibres to the luniges, whereby the luniges are thereto very fast knit. And to the inuolucere of the hart, where the same coate couereth the midzeif, in great scope, is continued, & tyed. But the outside of this Membran, which groweth euery where to the partes adiacent, is rough, and vnequall, after the maner of Membrans connected and tyed together.

The perforations
of pleura.
Col. Lib. 2. cap. 17.
The great arterie
doth not perforate Pleura.

It is perforated as oft as the midzeif, since it couereth it, that is to say, twise, not thre tymes, as *Vesalius* would: once for the descense of the stomach or upper Orifice of the Ventricle, and the second tyme for the ascense of *Vena cava*: but in dede the great Arterie, runnyng close by the body of the Vertebres, cannot perforate the same, but is rather crossed ouer therewith, or to be playne, the midzeif rather seemeth to giue backe to the side thereof. Under the Cannell bone, it is not pearled with a large and continuall hole, but the vessels which creepe vnto it thether, it containeth with very many holes, and groweth vnto them. Here likewise it transmitteth the bzaunches of *Vena cava*, and *Arteria magna*, as also the stomach, rough Arterie, the Perues of the vj. payre of sinewes of the bzaune, and the Perues to the midzeif. Last of all, in the hinder part, it is perforated, after the longitude therof, and that on both sides, with an orderly consort of Veynes, and Arteries, entryng forth, that way, to the spaces of the ribbes.

The substance of
Pleura.

This coate is in substance Membranous, to wit, hard, thinne, equall, and somewhat, in strength, surmountyng *Peritonaeum*. And like as *Peritonaeum*, so also the substance of this Membran, is, at the backe, harder, then neare the brest.

The beginning of
Pleura.

For the beginning therof, is taken from the Ligamentes, which bynde together, the bodyes of the Vertebres: upon those, I say, it chiefly doth depend. But it is not

not simple, although *Vesalius* espied not the contrary, but double: I meane not the right side, and the left, but that every where this Membran *Pleura*, is two fold, or double, or simply two Membrans, the one interne, the other externe, betwene which Veines, Arteries, and Nerves, do slide: all which are caried betwene the spaces of the ribbes. Whence it happeneth, that, there, many tymes, springeth inflammation, with much tension, and prickynge dolour, called the *Pleurisie*. *Columbus* indgeth the cause of this duplication the deepe verteritie of Nature, that so, the outer might defend the inner Membran (then which nothing is moze sensible) from the rigour of the ribbes, which should haue bene profered, alway, through the perpetuall motion of the lunges.

Beside this succingent coate, the ribbes haue to them, one peculiar, which is no other, then the Membran commo almost to all bones, called (in that it covereth the bone) of the *Graeces Periosteo*. But *Pleura*, in that it bewrappeth what soeuer is contained within the concavities of the brest, doth, like *Peritonaeum*, lend coates to all the partes contained, firmly thereby knittynge every organ to other. Last of all, it so properly prepareth way to the Nerves of *Septum transversum*, as that it deduceth them, hio as it were in a scaberth, to it. This, for the vse therof, in that it clotheth, defendeth, and strengthneth the inner partes, is called a coate: but as touchynge the substance, a Membran.

This Membran, or rather these Membrans, crepeth downeward after the sides of Sternon, towarde the Spine, the right among the selues beyng distant from the left: and beyng so fastened to the same spine, do deuide the brest into cavities, and the lunges into two partes: neither that rashly, but that, one side beyng hurt, the other (not withstanding) might escape free, and serue to natures vse, & retaine at the least halfe their action. This reduplicatio (as we may call it) of *Pleura*, is in this place, called *Mediastinum*, because it midmeasureth the brest, beyng led from the toppe of the brest, to the bottome, or lowest part. Betwene *Mediastinum*, that is, this double *Pleura*, deuiding the brest into two, some matter may be gathered, which, Sternon beyng perforated, may be drawne out, by a diligent Chirurgian, and in Anatomieall practise expert.

Within the upper part of the brest, where the veines and arteries are deuided, appeareth a certaine Glandulous part, called *Thimus*, which in Calues, and such others creatures, is most pleasaunt to be eaten. I suppose we call it the swete bread.

About the middelt of *Esophagus*, are two litle Glandules, placed there of nature to humect, and moisten that passage.

There is a certaine coate, common to the inside of the nostrils, to the palate, and to the toung, and it seemeth to be a portion of *Dura mater*, or the hard Membran of the brayne, which, after it is crept forth of the Scull, is amplified, made thicker, and almost fleshy: wherewith when as the whole palate within, and the mouth is clothed, as the furthest part, or extremitie of the palate, it becometh double, and somewhat lengthned, constituteth a round, long, and litle thicke pendule, called by diuers names: as *Vna*, *Vuula*, *Columella*, *Gargareon*.

The office of it is to deteyne the humiditie fallynge from the brayne, neither that in bayne, but beyng there holden, to moisten those partes, whose motions are perpetuall.

Neither doth it meanly auayle to the vtterance of voyce, and pronounciatio, as apparantly we are taught, by the example of such, as long haue laboured in the Spanish disease, to the vtter ruine and vastation of this part: how afterward (I say) they speake rather after the maner of crooges, then men.

A third vtilitie also hath this same *Gargareon*, and that is, lest the dust, which sometyne meeteth vs at vnwares, our mouthes beyng open, should infeste and

Cc.ij.

trouble

Col. Lib. 11. cap. 3.
Pleura consisting
of 12 membrans.

Col. Lib. 6. Apho.
com. 33.
Where hapneth
the Pleurisie.
Why Pleura con-
sisteth of 12.

Vesal. lib. 2.
periosteon.

The vtilitie of
pleura.

How pleura is
called a coate and
how a membran.

Col. Lib. 11. cap. 11.
The progreffe of
Pleura.

Why the lunges
are deuided into
12 partes.

Mediastinum.

In Mediastino
matter may be
gathered and also
drawne forth.

Thimus.

The vse of the
glandules of *Esophagus*.
Col. Lib. 11. Cap. 4.
The coate to the
nostrils, palate
and tongue.

1.
Vnula, and the
office thereof.

2.
The defect of
Vnula what causeth
etc.

3.

The feuenth Booke of the

De pnes to Vnula.
Vid. lib. 6. cap. 6.

To whom the
drawing of cold
ayre much hur-
ter.

Col. Loc. cit.

The Glandules
called Paristhima.

Pharynx.

The inuolucure of
the Glandules
Paristhima.

The situation of
the lunges and
hutting.
Diuision.

Figure.
Why the lunges
are inwardly hol-
low.
Why the lunges
is deuised into
lobes.
Col. Ibid.
Why the lunges
is deuised into
more lobes in
beastes then in
men.

The substance of
the lunges.
The inuolucure of
the lunges.
The vessell is in
the lunges.

The description of
Aspera Arteria.
The vse of Aspera
Arteria.

trouble the rough arterie, whiche this rather intercepteth by the way. Veynes, into the middell thereof, it receiueth from those branches, sent to the coate of the palate, but, with Perues, both participate little. It is euident also, that, to what persons this Gargareon is wanting, to such, the cold ayre is much more greuous then to other men as testifieth *Gill. Lib. 1. de vsu partium.*

On both sides of the iawes are two Glandules: one on the right side of Gargareon, and the other on the left: and they haue to name *Paristhima: tonsilla, amigdala, fauces*: these also (being of Glandulous substance) were made to the receiuing of the humiditie of the brayne, & therfore were they placed thus in the iawes (called of the Grecians *Pharynx*; of the Latins *Fauces*) to minister vnto them moisture. But the iawe is contained within these borders, the foundation of the head, and palate, the anterior bodies of the Vertebres of the necke, in which place, sundry, and many organs appeare: as the toppe of *Trachea Arteria* called *Larynx*, the bone called *Hyoïdes*, and his Muscles, the roote of the toung & his Muscles, the vs. payre of sinewes, & inner veynes called *Inguiales*, the arteries *Carotides*, *Gargareon*, the neither iawe, and a portion of his Muscles, the Processe *Styloides*, and the stomach or *Esophagus*. Therfore these same Glandules, being vsed in so strete a place, are, from the elders, called *Paristhima*.

Entwapped they are in the same Membran, wherewith we haue sayd the mouth and palate to be clothed: which, further descendyng, runneth to *Esophagus*, constitutyng his interior coate: as also the inner clothynge of the Ventricle, and intrels: and yet more downward, behind the toung, inueth the Epiglottis, *Larynx*, and the rough arterie, euen to the extreme partes of his branches disper sed throughout the lunges. But the outside of this rough arterie is shrouded vnder the succingent Membran, called *Pleura*. And thus much, being exactly wayed, is sufficient for these partes.

The lunges are sited in the brest, wherof the greater part they occupy, being bound to the bodies of Vertebres, to the hart, and to the rough arterie: into two partes this agayne is deuised, a right and a left: wherfore some infer that there be two lunges. The figure of it outwardly is round, inwardly hollow: & that necessarily, since so it behoued it to yeld vnto the hart, and *Pericardion*. But besides that diuision, this instrument, the lunges, is deuised (to the end it might both be more agile, and easie to moue, as also, more aptly to embrace the hart) into foure lobes, not into five, as in beastes Galen approued. Which diuersitie is thought to happē, because in them the liuer is much distaunt frō the hart. Wherfore when the hollow Veyne, so long way from the Vertebres, is distaunted, it required a boulster, wherewith to be vnderlayd: so that prudent Nature then willed, that the lunges, in beastes, should by one lobe, surmount the same instrument in the body of mā: which lobe, in those creatures, is strewed vnder the hollow Veyne: but it is hollow, as Galen most excellently hath sayd, because it giueth place to the roundnes of the hollow veyne. But since that in man, betwene the hart, and liuer, onely the midreiff lyeth, there was no nēde at all of the v. lobe.

The substance of the lunges is rare, light, and porie, as a sponge, in colour somewhat red, which kynde of substance the elders haue named *Parenchyma. i. Affuso*. It is inuolued of the Membran *pleura*, lately described, being there very porie. Through this instrument, the lunges, these vessells are disseminated: so wit, the rough arterie, the veniall arterie, and the arteriall Veyne.

The rough arterie is caried in throught the longitude of the necke, in the fore part vnder *Larynx*, consisting of gristelly ringes, but not perfect ringes (as in the Viscery of Cartilages appeareth, where the rough arterie is at large described) which deuidyng into a right & left first, and those, by litle and litle, into many others, is waisted, in branches, to the extreme partes of the lunges. The office & seruice

seruice which it oweth to nature, is to carie ayre, both in, and out: and from the bypper partes proceeding, goeth downe to the lower.

The veniall arterie, from beneath, is carryed almost straight upward, beyng first also deuided into a right, and left part, then diuers wayes ramified, and appoaching to the branches of the rough arterie.

The same likewise doth the arteriall beyne. Thus these three vessels are embraced of a substance rare, light, and porie, thus beyng the lunges engendered.

Whose vse is, as the Anathomistes rightly write, for the coling, and refrigeration of the hart: this effect beyng wrought, by the bringyng of cold ayre vnto it. And who likewise knoweth not, that the same both serueth to inspiration, expiration, and voyce.

All which offices, of right appertaining to the lunges, I can proue by the testimony of euery Anathomist: since herein, as with one consent, they accord & ioyne together: but scuerally *Columbus* addeth one of great effect, and nothing touched heretofore of any other. For it is (sayth he) the preparation, yea almost the generation of vitall spirites, which after are perfected in the hart. That is to say, the inspired ayre it receiueth, through the mouth, & nostriles, it beyng brought, by the conuicance of the rough arterie through the substance of the lunges: the which instrument ceaseth not to mixe the same ayre, with that blood, which is brought vnto it, by the arteriall beyne, from the right ventricle of the hart. For this same arteriall beyne, besides that it bringeth blood, for nourishment, is so large, as that it may serue for other vse also. And this blood by syrring, through the continuall mouyng of the lunges, is made thinne, and together with the ayre mixed, which thus, by the same refraction, and beatyng together, is prepared: so that, the ayre, & blood, together mixed, are receiued by the branches of the veniall Arterie, & at length, by the trunk of the same beyne, sent into the left ventricle of the hart: but so wel mixed, and attenuated together, as that to the hart, small labour at all is left: after which small elaboration, the hart (as it were) laying to the last had, to the making of the vitall spirites, that, by meanes of the great arterie, they might be distributed to all the partes of the body if was most requisite.

The which new assertion, of late inuention of *Columbus*, because it was like to be much spurned at, and by all meanes possible (especially of those that had sworn them selues to the decrees of *Galen*, and *Vesalins*) confuted, and reiected: the same Authour hath (as it were) entreated vs willingly to contemplate, first, the magnitude and largenes of the lunges, which without vitall blood could not endure, when as there is not the least particle in all the body that is destitute therof. But if this vitall blood be not begotten in the lunges: from what part might it thither haue bene sent, but from the great arterie: and thence (sayth he) not one branch, great, nor litle, is conuayed to the lunges. For to this purpose, as touching the veniall arterie, or arteriall beyne, he demaundeth how, by them, vitall blood should be brought vnto the lunges, whilest nether of them doth beate: but serue for other speciall offices, as shortly more largely shall appeare.

There are litle small *serues*, which touch onely the coate of the lunges, but pearse not within: which maketh that the lunges are with very small sense endewd: notwithstanding that it is a member greatly needefull, and so necessary. The coate wherof, since it is porie, no maruel that in time of *pleurisie*, & inflammation of the lunges, it receiue blood into it, which spettle outwardly declareth.

To conclude, the lunges, so needefull to the refreshyng of the hart, nature did not onely deuise, as also, lest it should be serued at any tyme with vnprepared ayre: but many creatures she would haue byeth, for the cause of voyce also, so requisite to their life and naturall beyng. That therfore, which is given out from the lunges in the tyme of expiration, is the excellent & notable matter of voyce.

Cc. iij.

The

The veniall Arterie.

The Arteriall beyne. The vse of the lunges.

A new vse of the lunges.

How vitall spirites are engendered.

By the largenes of the Arteriall beyne the vie is found out.

The vitall spirites perfected in the hart, are caried by the Arterie Aorta to all the partes of the body.

How *Columbus* satisfieth his opinion as touching the generation of vitall spirites in the lunges.

The *serues* of the lunges touch the coate but pearse not.

How hapneth bloudy spittle in the *pleurisie*. *Vesal. Lib. 6. cap. 7. The matter of voyce. Gal. Lib. 6. v. 6. part.*

The seuenth Booke of the

Vid. Lib. 5. cap. 8.
The inuolucere of
the hart. Pericar-
dion.

Figure.

The perforations
of Pericardium.

- 1.
- 2.
- 3.
- 4.
- 5.

Which is the
seate or founda-
tion of the hart.

The situation of
pericardium.

The substance of
pericardium.

The cavitie of
pericardium.
Pericardium bea-
reth no fatte.
Intersepient
membzans are
those whiche
grow about those
vessels betwene
the lunges and
the hart.

Where pericar-
dium groweth to
Septum transversum.

The Membran enuolupng the whole hart, with his auricles, & begynnynge of the vessels, like a certaine casket, or case thereto, is called of the Grekes *Pericardion*, in Latin *Cordis inuolucrum*: some *Capsula cordis*, so: that it is as a certaine house vnto the hart: the barbarous number; by the addition of one letter pronounce it *Capsula*. But we will vse here to say the inuolucere of the hart.

The image, or portraiture wherof is very like vnto y^e fourme of a pine nut, haupng a round orbiculer foundation, and a blunt poynt.

But the foundation of the hart is not continuall with the inuolucere therof, but at least pearced through with v. holes, whereof two yeld way to the hollow Veyne. That is to say, one, where the same doth perforate the midzeif. But the second hole is that, where the same Veyne, rising vplwardes from the foundation of the hart, goeth to the Cannell bone. The thyrd letteth in the veniall arterie. The fourth is prepared for the great arterie. And the fift yeldesth way to the arteriall Veyne. To the partes of these vessels, distaunt a notable space from the vpper face of the hart, this inuolucere groweth, after a sort fetchpng his begynnynge from them. The rest of y^e inuolucere, transmittynge no vessel, is whole, and cōtinuall, and euery where alike, save that from the foundation downwardes (as is sayd) it stretcheth into a blunt poynt, after the fashion of the hart.

The foundation, or seate, is meant to be the toppe, and highest part therof, which in man, is placed somewhat higher then the body of the fift Veriebre of the brest, yet lyeng not close thereto, but ouer agaynst it.

Besides, this inuolucere, in the progresse or descēse therof, varieth as touchpng situatiō. For in mā, whose soze part of the brest nature hath made shorter, is seated so crouked, towardes the left side, & agayne forwarde, as that the poynt after a certaine maner reacheth moze downward, thē that part of y^e brest bone, whereto the vpper part of *Septū transversum* groweth. And againe so much appertaineth to the left side, as that the right part of his poynt scarce attaineth to the middest of the brest. Also to the soze partes the poynt so proceedeth, as that it may touch the left side of the brest bone, and Cartilages coarticulated or knit thereto.

It consisteth of Membranous substance, and with the other Membrans therofore numbred amongest the similar partes of the body. For it is enterwouen with no Fibres, but is a simple Membran, euery where thicke, very hard, and constitutynge a concavitie, wherein the hart may both vse his dilatation, and contraction easely. For the hart, in it selfe, containeth no portion growpng thereto, but is distaunt euery where equally from it.

This cavitie is altogether smoth, wette with a certaine thinne humoz, and destitute of all fatnes. And so is the outer face of this inuolucere, although Aristotle farre otherwise supposed, affirmpng the inuolucere of the hart to be fat, deluded peradventure with the intersepient Membrans, which, growpng to this inuolucere, are very fat, especially in man. But the exterior face of this inuolucere, for y^e Fibrous knittynge, as Membrans growpng together, is rough. To the anterior part of the inuolucere of the hart, whereto those Membrans are not knit, Membranous Fibres, fulfillpng, or supplpng the roome of these Membrans, do grow. But to the whole posterior part, the intersepient Membrans are frēly growpng.

All the poynt, and egregious portion of the right side of this inuolucere, groweth very strongly, and in most ample space, to the sinewy circle of *Septum transversum*: whiche thyng in deede is peculiar to man, since in Dogges, Apes, and Swine it is much distaunt from the midzeif. Also, in man onely, the anterior part of the poynt cleaueth to *Pleura*, with Fibrous knittynge, in that part (I meane on the left side) where the Cartilages of the vi. and vii. ribbes are bound vnto the brest. But that knittynge of the inuolucere is brought to passe among the Membrans that denide the brest in the middest for no where the inuolucere of the hart

hart exceedeth the middest of them, nether in any part toucheth the lunges, but by their interuenture.

Moreover there are no arteries dispersed in this inuolucure, neither veines, vnlesse it be some small ones, springyng from those whiche are deriued to the intersepient Membrans, as others to *Omentum*. For when it transmitteth *Vena cava*, it borroweth of it scarce any thing: but where it groweth to the midzeif, it chalcengeth to it the vessels comon to the midzeif. Serues also it purchaceth, though very obscure, procedyng from those, out of which there current nerues do bzaunch. Thus this Membranous inuolucure, beyng as a fine bore or case vnto the hart, susteineth the same, by the ayde and benefite of the intersepient Membrans.

In the space or distaunce contained betwene this inuolucure *Pericardion*, and the hart, a certaine watric humoz is contained, lest the hart by perpetuall moynges might be dreyed: whiche although *Masheus Curtius* doubted to be true, the truth notwithstanding, both in dead, and liuing bodies doth testifie it selfe.

The hart, within this inuolucure closed, beyng the fountaine of vitall heate, and perfectoz of vitall spirites, after they are laboured in the lunges, as before is touched, is also the originall roote of all Arteries, but not of Serues, neither Veines, as fondly some haue fabled.

The figure of the hart is not much vnlike the pine nutte (but somewhat depressed) that is to say, haupng a broader foundation, but endyng by litle and litle, at a poynt somewhat sharper then the pine nutte, & is much more long then thicke. All the exterior face therof, from the foundation or seate, to the extreme part of the poynt, is very euen and smoth, growyng to no part at all. Notwithstanding the bzaunches of the coronall Veine, runnyng from the seate to the poynt of the hart, with the fellowshipp of their Arteries, which swellvng with bloud do cause a litle inequality, but not much, because y greatest portio of their bodyes, is impressed within the substance of the hart: so likewise doth the fat, wherewith mans hart aboundeth, enduce some inequality: but the foundation of the hart for the goyng forth of the vessels, is every where vnequall. For to the right side therof, the right auricle, together with *Vena cava*, & the arteriall beyne, is committed. But it hath on the left side the left auricle, and besides the veniall arterie, the begynnyng of the great arterie. Of which more at large hereafter.

The hart, although it was of sapient nature situated in the brest, yet not in the middest of the body, for the centre is onely occupped of the nauell: nor in the middest of the brest, as Aristotle supposed and the common people at this day do thinke. For onely the seate of the hart, which, since it is the originall of the vessels, is supposed the most noble part, exactly obtaineth the middest of the right and left side of the brest: both beholdyng the anterior, & posterior partes. For so farre it is distaunt from the brest bone, as it is in space from the bodyes of the Vertebres. Of the longitude of the brest, which is constituted of xy. ribbes, it respecteth the body of the first Vertebre. But in the anterior region of the brest, which is ended by the longitude of the brest Bone, it obtaineth truly the middest, beyng so much remoued from the Cannell bone, as distaunt from that part of the brest bone, whereto the midzeif is inserted. And thus in his seate, this noble part is safely situated, beyng much remoued fro the iniuries which outwardly might happen. From which part, the rest of the body of the hart, by litle and litle, is so reached forth towarde the anterior partes, and into the left side, as that the posterior part of his point, bendeth more to the brest, and forwarde, then the centre or middest of the foundation: and the right part of the poynt beyng more to the left side, the middest of the same seate, erradeth the middest of the brest bone, into the left side, and the centre or poynt of the poynt respecteth the Cartilages of the vi. or vii. ribbes on the left side, where they are bound vnto the brest bone.

Veins and arteries to the heart.

Nerves.

The watric humoz contained in pericardium, and the vse of it. Col. lib. 7.

The hart.

1. Vessel lib. 6. cap. 9. The figure of the hart.

The circumscription of the hart.

2. Col. lib. 6. cap. 9. The situation of the hart.

The seuenth Booke of the

Furthermore it lyeth so apt for the embracing of the lobes of the lunges, as most readely the vessels might, from the one, to the other be conuayed.

The chief substance of the hart doth consist of flesh not altogether so red as the flesh of the Muscles, but in hardnes, thiknes, & interwearyng of Fibres, much varyng from it. For the flesh of the hart is much harder, and thicker, to beare out iniuries farre moze able, (for so it was expedient considering his motion) and finally, with diuers kyndes of most strōg Fibres endewed: whereas the flesh of Muscles is not so firme, but contented with foure Fibres, that is for the most part one kynde, and those moze strewngly set, accōdyng to their required actiō, as in the history of Muscles: whence the error of those is detected, who soeuer they are, that affirme the hart to be of Musculous substance.

Three sortes therfore of Fibres are cōteined in y^e flesh of the hart, that is to say, straight, oblique, and transuerse. The straight we call those, which from the foundation, are caried to the poynt of the hart. Those transuerse, which, in crosse or compassing wise, goe about the hart, and those oblique, that chose their course moze slopetwise then the others.

The flesh of the hart auayleth to the principall functions therof, which especially consist in the makynge of vitall spirite, or in makynge perfect the same, after the labour of the lunges, as *Columbus* assureth vs.

The Fibres serue to an other function: for by them, the hart, whilest the creature liueth, is dilated, and contrahed, and somewhiles resteth betwene contractiō and dilation. For eouer they serue to the mouyng of the hart, which is naturall, and nothyng subiect to our will, as thus: the straight for attracion, the transuerse for expulsion, and the oblique for retention. And these motiōs of the hart are called *Diastole*, and *Sistole*: and *Diastole*, when the hart in his dilatation receiueth in of spirite, like as *Sistole* is, when the hart by contricion putteth forth the same.

The seate of the hart is compassed round about, which the Cleyne called *Coronalis*, that so the hart might be nourished by his blood, to the which Cleyne also is ioyned in felowship, the arterie called *Coronalis*, which is yet to describe, and which sometyme are i^y. to the end that by meanes and helpe therof, the substance of vitall heat might be quickned. Wherefore (sayth *Columbus*) some man may doubt, yea, & by the premisses, frame a sufficient argument to proue, that the vitall spirites are not begottē in the hart, but in the lunges. Albeit he referreth the case to the moze sapient Philosophers to discusse. And so it shalbe sufficient, here, truly to describe the partes of the body, how they are, & to what vse created, least I meddle ouer farre in such misteries.

To the seate moze out of the hart, is offred a litle perue, procedyng from the left sinew of the v^y. payre from the vayne, whereas it constituteth the left recurrent perue. For this pearling through the seate of the hart, his inuolucere, and reached forth to the left side and posterioir part of the arteriall Cleyne, creepeth very obscurely into the foundation of the hart, and that onely for the feelyng of annoyances.

The coate that groweth close vnto the substance of the hart, is altogether answerable to that *Pembrian*, whiche so firmly groweth to the bellies of the Muscles, I meane that most thinne *Pembrian*, which from the substance of the Muscles may not be plucked. Upon which coate, in mā chiefly, groweth plenty of hard fat, but that most commonly, about the seate of the hart: though sometyme it be refused euen dolone to the poynt of the hart, by the sides of the Cleynes, and Arteries sprinkled about the body therof. Which fat was for the continuall mouyng of the hart very necessary. For to that end, we finde fatnes also in very many partes of the body, and chiefly about the eyes, and ifpoall Muscles, least they should be dzyed by labour.

1.
The substance of
the hart.

Gal. quoque. Lib. 2.
de te peramentis.
Cap. 4.

Fibres.

Col. Ibid.
The substance of
the hart is not
musculous.

Vesal. Ibid.
Which are the
straight Fibres
of the hart.
The transuerse.
The oblique.

The vse of the
flesh of the hart.

The vse of the
Fibres.

Cardis motus a natura.
Gal. lib. 7. vi. part.
Col. Ibid.
What is Diastole.
What is Sistole.

5.
Col. Loc. citat.
The Coronall
vayne
The Coronall Ar-
terie.

Vesal. Ibid.

The vse of the
nerue to the hart.

6.
The coate next
the substance of
the hart.
The fatne of the
hart.

Col. Ibid.
The vse of the
fatne to the hart.

Beside fatnes, the hart hath litle eares or auricles. For so the authors of dissections, do call those two Appendices, growyng to the seate of the hart. They are called by the name of eares, not for their use, nor any action, but for similitude sake, which they obtaine, in situation, like vnto the proper eares.

The right eare is set to the right side of the seate of the hart, coueryng all the fore part of the insertion of *Vena cava*, after his longitude, and with his poynt departing from the body of the Veyne, rayseth it selfe vpwordes, somewhat higher then the seate of the hart.

The figure of this auricle is like a poynted steeple pillour or other building, whose broadest part is the bottome, and thence the nearer to the top, the narrower. For so it begynneth, but at a long fashioned foundation, & goeth forth into a sharpe, albeit not very sharpe, nor long. The exterior face of the auricle varieth, according to the fulnes, or emptines therof. For when in the constriction of the hart, it swelleth, being filled, then it is Gibbous, euery where equall, & as with a watric humoz annoynted. But beyng fallen, and emptied, appeareth wrinkled, and set with foldes. Sometymes also, though very seldome, it chaunceth, that the outside of the distended auricle appeareth vnequall, but that is through fatnes then, that groweth vpon it. The inside or interior *Superficie* of the eare, circumscribing a cauitie, is wholly aunswerable to the same side of the Ventricle of the hart. For like as that, where the vessels are inserted & educed, is smooth, but eche where els rough and full of canes: euen so that eare, where it groweth to the insertion of the hollow Veyne, is smooth, but in all the other rowme beside, so full of Fibrous foldynges, as that it surmounteth the ventricle of the hart, in inequality.

The substance of the auricle is litle, but that very hard and skippy flesh, where in it much differeth from the hart, but in that it containeth the these sortes of Fibres, it is therein aunswerable to the flesh of the hart.

The setting to of the auricle is much after this sort. The left side of his seate, groweth to the extreme part of the substance of the hart, where the anterior region of the Office of the hollow Veyne consisteth in the right Ventricle of the hart: or more truly, the auricle goeth forth from that same extreme part. But the right side of his seate, groweth to the body of the hollow Veyne, after the longitude of his insertion into the hart, and in the anterior part therof, beyng made, as it were, one body with the veyne. The rest of the auricle is free fro the knittynge to of any part, beyng contained also within the inuolucere of the hart, though with no Fibrous knittynge committed thereto.

The left auricle of the hart, is in very many poyntes like vnto the right. For it consisteth in the anterior seate of the rising of the veniall arterie according to the longitude therof. And so from his seate also, ceaseth at his poynt, as is sayd of the other. Which poynt beyng sharper then the poynt of the right auricle, but is reached more toward the left side. Besides, the left in more aged persons, giueth place to halfe the largenes of the right auricle, like as the Office of the veniall arterie, is much lesse then the Office of the hollow Veyne.

As touchyng the inside and outside, the auricles are euery where one like another. Although the exterior *Superficie* of the left, is alway more wrinkled and vnequall. In substance also they are agreable, but the left is much harder, and in constriction and distention is lesse obedient. And if it be compared to the right auricle, it appeareth feeble and dzyed, and on the outside alway, aboundyng more with fat then the right.

In knittynge they agree altogether. For as the right groweth to the right side of the hart & *Vena cava*, nigh the insertion therof: so in like sort the left in the right side of his seate groweth to the substance of the hart where the veniall arterie goeth forth: but on the left side to the same body of the veniall arterie.

7.
Vell. 110d.
The eares of the hart & why they are so called.

1.
The description of the right eare to the hart.

Figure.

Substance.

Fibres.

Situation.

2.
The description of the left eare of the hart.

The seventh Booke of the

208.

In vse notwithstanding they differ, although very litle. For when as the hart with great force, doth receiue his blood into the right Ventricle from *Vena cava*, and as it were in snatchyng wise, doth swallow it, the same *Vena cava*, not consisting of any strong or arterious body, should greatly haue bene daungered, I meane for breakyng, in that strong attraction of the hart: saue onely that therfore nature created the right auricle of the hart, which beyng obedient to the mouyng of the hart, and full with blood, should poure forth the same blood which it containeth, into the right ventricle whē the hart is dilated, and that the same should be, after a sort, rowled into that ventricle to dispence with the force of attraction, and to be to the hart, as a ready hand or storehouse. Answerable to which vse is the cuticular construction of the auricle which is light, and to the suffering of injuries resistaunt. Hollow it is to containe the matter, and construct with Fibres, as a thyng subiect to attraction, retention, and expulsion.

Likewise the left auricle of the hart, growyng to the veniall arterie, beareth altogether the like seruice vnto it, and to the left ventricle of the hart, as we haue sayd the right eare to be in vse to the right Ventricle. And so much the lesse is the cavitie of the right eare, by how much the Orifice of the veniall arterie, is narrower then the orifice of *Vena cava*. In mouyng also, ayre is more ready to folow then blood, so that for this occasiō also, the left auricle is made lesse thē the right.

The hart of mā obtaineth within, two notable and large cavitie, called of the Latins *Ventriculi* or *Sinus*, sitē after the sides of the hart, one on the right, the other on the left. Wherof the right exceedeth the other in largenes, and both of them in fourme varie much one from an other.

For the right descendyng more downwarde to the poynt of the hart then the left, hath his cavitie made like the Pone encreasing. As in the right side, anterior, and posterioir part, like the inside of a halfe circle, there aunsweryng to the exterior *Superficie* which is Gibbous. But on the left side of it, it is Gibbous like the outside of a halfe circle, by meanes of the hedge betwene the Ventricles, which as a thyng halfe round, boucheth into the amplitude of the right Ventricle. And this fourme the right Ventricle of the hart obserueth, from the seate down to the point. No otherwise then as the figure of the hart is made also from his seate narrower.

The left Ventricle also begynneth with a large seate, but by litle and litle becommeth stretter towardes the poynt of the hart, obtaining as touching the whole *Superficie*, a round cavitie like a Pincapple. For the hedge that is betwene the Ventricles of the hart, on the left side, wherewith it maketh the right of the left Ventricle, is hollow contrary to the other side, which boucheth into the right Ventricle, and hath equall thickenes and nature with the substaunce of the hart, constitutyng the anterior and posterioir partes of the left Ventricle. But the whole substaunce of the hart, beside of the hedge of the Ventricles, constitutyng the amplitude of the right Ventricle, is very thinne. But that which effourmeth and compasseth about the left Ventricle, surmounteth much in thicknes the substaunce of the right Ventricle, and is euery where a like thicke, sayng the seate onely, where for the insertion of the vessels, so much substaunce must needes wāt, as the amplitude of the Orifices do occupy space.

The *Superficie* or inside of both the Ventricles is very vnequall, and beset as it were with many caues, deeply impressed into the fleshy substaunce. Neither do these consist onely in the sides where the right ventricle respecteth the left, but round about, throughout the whole *Superficie* of the ventricle: and that not onely in new dissected bodie, but perpetually apparait as oft as you lust to behold the hart: neither at any tyme not apparyng in a dyed hart besides this inequality, which in the left ventricle is something greater: both of them haue inwardly certaine

taine fleshy explantations or Processes, which are round and slender, and cease into Membranous Fibres, continuall or ioyned to the lower seate of the Membrans in their borders reposed. These Processes are chiefly discerned fleshy at the poynt, or lower part of the Ventricle, which make to the strength of the Fibres, which they conteyne.

That thzough the hedge situated betwene these two Ventricles, blood should passe, as it werc by refudation, from the right into the left Ventricle, almost all Anathomistes hetherto haue affirmed. And that the same in passage also should be made thinner for the moze easie generation of vitall spirites. But very wyde they wander, sayth *Collumbus*. For the blood thzough the arteriall Veyne is carried to the lunges, whence, beyng attenuated, it is carried by the veniall arterie into the left Ventricle of the hart together with ayre: which no man before his tyme noted, or at least haue left extant.

Col. Loc. cit.

Moreouer about the seate or foundation of the hart, foure vessels are apparent: two to the right Ventricle, and two to the left: in the right, the hollow Veyne, and arteriall Veyne: but in the left, the great arterie *Aorta*, and the veniall arterie.

Vessels of the hart.

Notwithstanding, esteeme not (as many suppose) that the hollow veyne both springing from thence: for it goeth not into the hart, as falsely they imagine, but beyng deuided or cleft a sunder in that place, cleaueth onely to the Orifice of the right Ventricle.

The arteriall veyne neither springeth from the hart, but from the liuer. For note, if we behold the same whilest the infant as yet is shrouded within the mothers wombe, we shall finde the hollow veyne to be continuall with the arteriall Veyne. In somuch therfore as it is a Veyne, it fetcheth the beginning from the liuer, but as touchyng that it is arteriall, fro the hart. For of all arteries the hart is the fountaine. It goeth to the lunges to carie blood for the nourishment of the instrument, and to the end, that the same may be altered for the hart. Sufficient great is this arteriall Veyne, yea much greater then was needfull, if the blood had bene onely to be carried to the lunges, in so small space about the hart. It is deuided into two trunks or notable bzaunches, both to the right, and to the left lunges: thence forth into sundry bzaunches, as before is sayd in the lunges.

The arterie named *Aorta*, which of all other arteries is the mother, springeth from the left Ventricle of the hart, and riseth vpward.

But before we prosecute the description of this arterie, it seemeth mete to speake of the veniall arterie, set to the left ventricle of the hart it is called an arterie, in that it serueth to spirites and arteriall blood: but a veyne, because it hath the body or substance of a veyne. It is a vessel sufficient large, which also thzough the lunges is deuided like the arteriall veyne.

The opinion of other Anathomistes is, that the vse of these diuisions of this vessel into the lunges, is to cary vnto the lunges the altered ayre, which are as a fanwynde to the hart, to coole the same: they supposing also that then the lunges do receiue certayne I know not what fumes fro the left ventricle. And this inuention both meruailously delight them: because they imagine that in the hart surely the like is accustomed to be done as in chinnepes: as though in the hart were greene stickes, which whilest they burne, do make a smoke or fume. Thus much *Collumbus* writeth accordyng to the sentence of other Anathomistes. But he himselfe iudgeth cleane an other way: as thus, that this veniall arterie is made to cary from the lunges, blood mixt with ayre, into the left Ventricle of the hart. Which thyng (sayth he) is as true, as that which is most true: not onely beyng apparant to euery inspection of dissected bodies, but manifest also in quicke dissections of creatures, how full of blood this Veyne is alway founde: which could

Do. it.

not

The ſeuenth Booke of the

not be ſo, if it had bene made onely for ayre and vapours.

It is to be noted that in the Orifices of the iiii. veſſels, at the ſeate of the hart, *ri.* Membrans do ſtand, called *Trifolca* or *ij.* edged that is to ſay *iii.* to *Vena cava*, *ij.* to the arteriall veyne, *ij.* to the arterie *Aorta*, & *ij.* to the veniall arterie: which are not all in figure alike. For thoſe which are put to the hollow veyne, & veniall arterie, are diuerſe in forme from the Membrans of the great arterie, and arteriall veyne. For the Membrans of theſe, are like *ij.* of thoſe letters which the Latins call *C*: but the others are like arrowes. The uſe of theſe is morvailous: and by their meanes, we learne and perceiue many thynges, that appertaine to the knowledge of the functions both of the hart and lunges. Know therfore, that as they are in figure diuers, ſo their vtilitie not all alike. The wickettes therfore (for ſo they may not much vnaptly be termed) of the hollow veyne and veniall arterie, are ſited from within forth, as ſeruyng to the emission of blood: but the wickettes of the other *ij.* veſſels, contrariwiſe, from without forth, or inward, that ſo they might ſeeme vnto vs to be made, for the containing of included blood. This alſo note, that thoſe litle wickettes, which from within forth are opened, abound here and there with certaine filmentes or thredes, diſperſed through the ventricles, made ſo to hold and ſtrengthen them. By which filmentes peradventure Aristotle was deluded, ſuppoſing them to be Nerues: ſo therfore he aſſigned the hart to be the roote of Nerues, and conſequently of feeling and mouyng. But to returne to the foure veſſels: two of them are made to carie into the hart, whileſt y hart is dilated: but the other *ij.* to beare forth in the time of conſtriction.

When the hart therfore is dilated, it receiveth blood from the hollow Veyne into the right ventricle, as alſo from the veniall arterie, prepared blood and ſpिरite into the left ventricle. Therfore thoſe Membrans lye downe and yeld to goyng in. For whileſt the hart is conſtricted, theſe are ſhut: leſt any thyng they haue receiued, ſhould returne or go backe agayne the ſame wayes: and at the ſame inſtaunt the Membrans, of the great arterie, and arteriall veyne are opened, and giue way to the goyng forth of the aterie blood, which throughout the whole body is diſperſed, and to the naturall blood caried forth to the lunges.

The matter therfore is alway ſo, that when the hart is dilated, the Membrans firſt mentioned, are opened and the reſt ſhut. So that you ſhall finde the blood which is now gone into the right ventricle, not able any moze to go backe agayne into the hollow veyne. By which ſenſe we gather that the hart by no meanes is that member whercin blood is engendred, as Aristotle ſayth, when as the blood is from *Vena cava* diſtributed.

This mozeouer know for a ſuretie, that in the hart of man is no bone to be found, although in Oren, Hoſes, and ſuch great creatures it may be ſhewed, but in man no ſuch thyng, except it chayne, that in very aged perſons the like be inuented: as in the Hiſtozy of bones I haue proteſted my ſelfe once to haue found. Onely a Cartilaginous ſubſtaunce at the roote of the great arterie, towarde the arteriall veyne is ſene, whiche a Bone in no wiſe may be called, although Galen him ſelfe would haue it ſo: whoſe ſentence partly I haue ſet forth in the place afore cited.

Suppoſe this aſſertio moſt approued in Anathomie, that all arteries procede from the hart, euen as all Veynes from the liuer, & all Nerues from the brayne.

From the left Ventricle of the hart therfore, ſpringeth that arterie named *Aorta*, of all other arteries in the body the mother. In quantitie it is ſufficient large, and in ſubſtaunce thicke and white. The cauſe of the thicknes is firſt, leaſt the blood with filled ſpिरite ſhould eaſely baniſhe and waſt, and ſecondly leaſt it in mouyng ſhould be broken. For the Arterie moueth continually, yet not by it ſelfe but through ſpिरites.

After

After that *Aorta* is gone forth from the hart, immediately it bringeth forth a small arterie called the *cozonall*, because it compasseth about the seate of the hart, to quicken and refresh his substance, in which it is diuersly disseminated: albeit you haue to note by the way that in some bodies this *cozonall* arterie is not onely one, but ij. and so *Vesalius* describeth it: but further ascendyng, it is deuided into ij. trunkes or stockes, one greater, the other lesser: the greater descendeth, the lesser ascendeth, that trunk is made the greater which I say both descend, for that the great portion of the body was to be reuined therewith.

The trunk ascending putteth forth an arterie from the left side, which is called the *Axillaris arteria*, which stretcheth forth obliquely towarde the armehole, and sendeth bzaunches to the superiour ribbes, and goyng forth to the arme chooseth his iourney after the inside, to mate himselfe with the inner *Basilica*, but sendyng a bzaunche upwardes, commaundeth others to all those Muscles, which are about the shoulder, the scapple bone, and his canitie, not saylyng the anteriour partes of the brest, nor the Glandules vnder the armehole.

But the trunk of *Arteria axillaris* descendeth straight through the inner region of the shoulder, downe to the boughte of the cubite: and before it passe this part, it giueth out a litle Arterie to accompany the fourth Nerue of the arme, whiche Arterie is among the Muscles distributed, that serue to extend the cubite: but so soone as it hath passed the bought of the cubite, it is deuided into two, sometyne into thre arteries, yet first it leuyeth litle arteries to those Muscles that are in the shoulder and cubite, and one bzaunche goeth neare to that Ligament that is set betwene *Cubitus* and *Radius*, and being gone forth marcheth to the externe Muscles. The remnant foloweth the longitude of the cubite: which after it hath folowed beyond vnder the inner transuerse Ligament of the wrist, in the palme of the hand, it is diuers wayes deuided, and to the extremities of the fingers deuided: but another bzaunche tendeth towarde *Radius* after his conduyng: and so soone as it is past the middest of the cubite, it ariseth betwene two Muscles: and goeth vnder the skinne by the inner part of *Radius*. This is that bzaunche, whose mouyng Whistions are accustomed to feele, when they lay hold of the wrist, to take counsell at the pulse.

By the way notwithstanding I wish thee this to note, that in some persons this bzaunche is diuersly placed, so that to be the same, whiche hetherto we haue spoken of, thou mayest take occasion to doubt, in that it is sometyne caried on the outside. So that what Whistion soeuer, bnerpert in Anathomie, shall in the accustomed place (chiefly in a sicke body) onely seeke for the pulse, and can not finde it, he will iudge vntuly death to be neare that person, and so prognosticate falsely.

Albeit no man may deny, but that very seldome it is otherwise situated, for in deede for the most part, it doth occupy the inside. This mozeoner so soone as it departeth from the wrist, it proceedeth through the outside, to the extremities of the fingers. An other bzaunche neare to the Ligament is caried.

This trunk afterwarde ascendyng, this *Axillaris arteria* beyng now dispersed, it is cut into ij. arteries called *Carotidas*, or *Seporarias*, which through the laterall partes of the necke, are straight caried to the seate of the scull, cleauyng to *Aspera arteria*, & fixed to the inner beynes called *Iugulares*. But before they enter into the scull, they send ij. arteries to the face, & beyng deuided vnder the neither iawe, they impart of the smaller sort, to the Muscles of the necke, of the head, of *Larynx*, of *Hyoides*, and of the tounge. But the two bzaunches (which are the greater) caried to the tounge, are caried throughout his longitude to the extremitie thereof, which iourney beyng atchiued, they ascend vnder the eare, and both before & beside the same, are to the tempoall Muscles eleuated, so then beyng to the fore head, to the skyns of the head, and to the Muscles of the face distributed.

The seuenth Booke of the

The other arme of bove therof, which to be caried backwardes we haue assigned, is bestowed vpon those ij. Muscles, which (according to *Columbus* inuention) are placed in the posterioir part of the head. So is it caried also to the skinne, and Muscles of the head. From the same place, and somewhat higher also two arteries fetch their begynnynge, entryng into the nether iawe, vnder the eare, in at the hole there (if you behold diligently) sitte, after the longitude of the iawe: with whiche Arteries a Veine and Nerue are ioyned in societie: but then they are disperised to all the rootes of the nether tath: a part notwithstanding goeth forth through the hole in the chinne, and marcheth through the lippe. This Arterie *Vesalius* forgot, in somuch that he hath made no mention at all therof.

But before we fall to the description of those arteries which are contained in the Scull, certayne others are first to be described, of which a part also is taken from the Scull.

It is to be noted therfore, that the right *Arteria axillaris* doth spring fro a place lesse exalted then the left. Whereouer it marcheth not in oblique order as it doth. But the begynnynge of it is fro the right arterie *Soporaria*, in the region of the Canell bone it goeth straight through the armehole vnder the Canell Bone: to the right arme: where it is deuided & marcheth forthward like as both the left. But from the anterior part, whence these *Soporaria*, & *Axillaris arteria* do spring, y. arteries do grow tendyng downwardes, & send their branches to the superioir spaces of the ribbes, & to the Vertebres, of which two arteries, *Vesalius* was ignorant: also other ij. small arteries do arise, which vnder Sternon are conuerted, & descend, associatyng those two veynes, which tended to the pappes, & to the borders of the straight Muscles. After their manner therfore are deuided.

Almost in the same region, but backwardes, towarde the bodies of the Vertebres, you shall note ij. other arteries, which being caried through the transuerse Processes of the Vertebres of the necke (so to that end nature left them perforated) as also through those holes, out of which the sinewes do procede, do commaunde their branches to the Spinnall marey and Vertebres, & to those Muscles, that side wayes do serue to bove the necke: albeit that in some persons these y. arteries are not from *Soporaria*, as in the most, but often from the arteries *Axillares*, produced. These arteries, which thus we substitute to animall contemplation, betwene the head and first Vertebre, do make ingresse into the posterioir part of the Scull: that is to wit, betwene the same Vertebre and the Spinnall marey: first ministeryng vnto the caue of labor in the of the eare y. arteries, which in their ingresse do mingle together. But in such order the right is vnited to the left, as that of both, one for the length of halfe a finger, is made: Into y. it is afterward deuided: then agayne into many others, and first they reach to *Dura* and *Tennis meninx*, and then to *Cerebellum*. By these the begynnynge of the Spinnall marey, *Cerebellum*, and part likewise of the braine, are reuiued and quickned: and if nature had not begotten, these (sayth *Columbus*) the posterioir partes of the Scull had wanted arteries.

These ij. arteries, whiche through the transuerse Processes of the Vertebres do arise vpiward, betwene the first Vertebre, & the bone of the hinder part of the head, enter into the inner region of the Scull betwene the same Vertebre, & the spinnall marey. But after they are entred into the cavitie of the Scull by the length of halfe a finger, they are ioyned together, and of ij. made one onely arterie.

Nevertheless they are agayne forthwith deuided, and that into a right and a left, from which, arteries are to the ij. Membrans of the braine, and to *Cerebellum* suborned. And further, through the substance of these partes, in the vpper part, through the halfe space of the Scull, most large is the distribution of these arteries. The rest of the Scull is reuiued by the ramification of the y. arteries *Carotides*.

Col. lib 7.

The beginning
of the left is
higher then the
right.

Col. lib.

carotides, or *Soporaria*, as shortly Galbe sayd. Which befoze they penetrate into the Scull, imparte of their power by litle Arteries into the laberinthe of the care. But so soone as this trunke of the Arterie is entred into the Scull, as is befoze sayd, it dispatcheth forth bzaunches to the Spinnall marey, to the hard and thinne Membran, to the bzaune, and *Cerebellum*.

Of these g. arteries the true distribution, no man hath knowne befoze *Columbus*, nether did *Vesalius* inuent it, who, whilest he was practised in the description of the Arteries ascendyng through the transuerse Proceses of the Vertebres, was contented to affirme, that they entryng into the Scull, do tend through that cauitie of Dura mater, into which the Veynes *Inguiales* do enter, but this rather he supposed to see with his eyes. Wherefoze (sayth he) no mervaille, if so much he deuied the description of auncient Anathomistes, as touchyng *Retemirabile*: since rather from these Arteries, of whiche he was ignorant, then from the Arterie *Carotides*, the mervailous net is effourmed: although neither to Galen these two Arteries haue bene knowne: therefore he sayth Veynes are carryed through the posterioir partes of the head, and Arteries through the Anterior.

But these two Arteries whiche we haue described, are vnder the Spinnall marey exalted vpwordes, and besides those manifold bzaunches, whiche are sprinkled throughout the thinne Membran, they passe into the substance of the bzaune, in that place, whiche is called *Canarium*, or *Glandula Pinealis*, in the extremitie of the superioir Ventricle, and there bringeth to passe a large and notable plicature, or weauyng: which (after *Columbus* opinion) may wozthely, for the marueilous workemanship therof, be called the marueilous nette, whiche is in the posterioir part fastened to *Torcular*. Into this plicature so notable and wozthy admiration, are inmitted two Arteries named *Carotides*, as in their place shall not be omitted. Therfoze of foure Arteries this marueilous nette is made, most notable to eche studious Anathomist, both for the dignitie and newnes of the thyng, which befoze *Columbus* was neuer taught or noted.

The Arteries *Carotides*, so soone as they are come to the seate of the Scull, they seeme to enter the hole, forth of whiche did passe the vj. payre of sinewes, and whiche doth take in charge the inner Veynes *Inguiales*: albeit they arise not by, nor here do byyng forth two Arteries, as *Vesalius* affirmeth: who also would haue them to enter into the cauities of the hard Membran together with the Veynes *Inguiales*. But then thou wilt say peradventure, what do these Arteries vnder the seate of the Scull? They are conuerted to the Anterior part, and passe through a hole, which lurketh in the tēporall bone neare that, through whiche the first coniugation of sinewes descendeth, and they enter among the inner *Inguiales*: but befoze they be receiued of the inner part of the Scull, they deliuer forth two Arteries, whose bzaunches are diuers, to wit, to the palate, to the inside of the nose, to the vpper teeth: others enter into the Scull by those holes there sited, and lyke a traē through the sides of the hard Membran, together with those Veynes therein conspicuous, are explicated, and therefore is *Sineiput* in that place creaued.

But after that these Arteries haue effused forth these bzaunches to the palate, & teeth as is sayd, they rise vp into the Scull through that hole, which is sited betwene *Sphenoides* & the tēporal bone, in which place a part of the thyrd payre of sinewes descendeth: although *Vesalius* for the same doth reprehend Galen. But so soone as they are passed the seate or sell of *Sphenoides*, they minister ij. Arteries to the eyes a long by the opticke sinewes, to shew lyfe vnto the eyes, and not only lyfe vnto the eyes, but also to the Muscles of the eyes, and to those by which the iaww is opened, I meane the vpper iaww: wherefoze you shall finde the

Col. Loc. cit.

Retemirabile.

This glandule in the bzaune beareth the shapē of pecus.

Torcular is the fourth cauitie of Dura mater quadruplyed betwene Cerebrum and Cerebellum.

Col. Loc. cit.

The seventh Booke of the

diuisions of these large and many.

That whiche remaineth of these Arteries *Carotides*, ascendeth about the aforesayd sell coherent with the thinne Membran, and after the callous body toward the posterious partes, and diuers wayes is sprinkled through the thinne Membran, aboue, within, and to the sides. Also some of their branches are deduced from the thinne to the hard Membran, and others from the thinne Membran to the substance of the braine.

The Arteries
called Carotides
or Soporariae.
The cuneal bone
is the bone Sphenoides
above mentioned.

Glandula Pini-
alis
called also Con-
arium.

After so many distributions of the *Soporiferous* Arteries about the sell of the Cuncall bone, they vnderlay the vpper Ventricles of the braine, immediately after they haue perforated the thinne Membran, the whiche Ventricles are anfractuons or full of foldes: and whereas at first they seemed but two, they are seuered into very small ones and those innumerable. There therfore you shall behold a most pleasant nette contered and wouen together of Arteries: the whiche Arteries haue their Veynes to them ioyned in fellowshipp, and in their endes lyeth the Pineall Glandule. These hath Galen described for the netlike folding, as though it might represent the Secundine.

Collumbus notwithstanding boldly affirmeth this (if it be any where at all) to be the marueilous nette: for no where (sayth he) shall you finde such foldes, through foldes, and interweauynges of the least, and innumerable Arteries, els. But Galen did describe the marueilous nette whereof he maketh mention, to be aboue *Sphenoides*, where that Glandule, whiche receiueth euery excrement begotten in the braines, beyng to that office by Nature dedicated, is resident. But whosoever shall seeke the same where Galen hath described it, he shall be frustrate of his purpose. For nothing els shall he finde there, but certayne litle Arteries, ministryng lyfe to these partes, and to the bone *Sphenoides*. The same Arteries, which thus constitute the marueilous nette, do send their power through the substance of the braine: whiche thyng of no other Anathomist, save onely of *Collumbus*, hath bene written.

And this is the end of the description of the superiour trunk of the great Arterie, without you make accompt of those Arteries to be described, which flow forth to the right superiour ribbes. This by the way is worthy to be noted, that not one Arterie tendeth to the lunges, whereby they might receiue vitall spirites from the hart. And this is a sentence most approued in Anatomic, that (exceptyng the lunges onely) all other partes of mans body are endued with beating Arteries. By whiche reason, *Collumbus* protesteth sufficient authoritie to what seueral disputer soener, shall goe about to proue, that in the hart it selfe are not begotten the vitall spirites. But of this matter is other where sayd.

The greater trunk of the great Arterie called (as we haue often sayd) *Aorta*, tending downewardes, declineth towardes the left side, and is to the body of the Vertebres adherent, whiche to the superiour trunk is not incident. For that, no otherwise then *Vena cava*, is distant from the Vertebres. This inferiour trunk therefore, whilest it descendeth, out of his hynder part profereth Arteries to the spaces of the ribbes: and these agayne charge others to the Spinali mare, to the Vertebres, and to the Muscles, in the posterious part of the brest sided. But where it commeth downe to *Septum transversum*, bringyng forth two a lyke Arteries, whiche are into the same distributed, it passeth vnder the same, and still cleauyng to the body of the Vertebres, marcheth downe to the last Vertebre saue one of the loynes. But so soone as it hath passed the middest, it produceth an Arterie to the liuer, in place whence *Hepatica* went forth, as we haue sayd: beyng there distributed. Another spreddeth to the vesicelle of choler, another to the splene, another to the

Uen

Ventricle and Omentum: other litle bꝛanches to the Glandulous body *Pancreas*, and others also to the intestine *Colon*. Under this an other appeareth, whereof are very many and large diuisions, both through *Mesenterium*, and to the small guttes: beꝑng perpetuall mates to many of the *Pesceraicall* veynes.

Moreouer a litle lower it begetteth two Arteries, and those very notable, called the *Emulgent Arteries*, which enter into the kidneys. Under the *Emulgent Veynes*, a litle more bendyng downe, it produceth the two seminall Arteries, whiche haue their begynnynge from the body of the great Arterie, but not from the left *Emulgent* (except in very fewe) as to *Galen* it seemed. These descendyng, are folded together with the seminall Veynes downe to the *Testicles*, both in man, and young mayde, and in women to the body of the matrice, yea to the inner part of the matrice: and from these the *umbellicall Arteries* of the infant, take their begynnynge.

Under these seminall Arteries, in the middelt of the trunker emergeth an other Arterie, whiche is caryed to the *Mesenterium* of the straight gutte, and to part of the intestine *Colon*, after the left side of *Ileon*. But the Arteries of the straight gutte, downe to the extreme part of the fundament, together with the *Pesceraicall Veynes* of *Venaportia*, do descend, wherfoze there are made both Veynes & Arteries called *Hemorroidales*: in the posterioꝛ part out of the same Arterie vnder the midzeif, Arteries make egress to the *Vertebres*, to the *Spinnall mareꝛ*, to the Muscles of the backe, and to the Muscles of the bellye.

But so soone as it is come to the last *Vertebre* of the loynes but one, and in some bodies to the last of all, it is first deuided into two and those great bꝛanches, whiche visite the right and the left side, but surmountyng the hollow Veyne in the region of *Os sacrum*. These two bꝛanches are subdeuided, and descendyng more, are ramified to the sides of the bleedar, to the necke of the matrice, and to the Muscles resident in the containtie of Abdomen. Two others likewise passe through the holes sited in *Os pubis* and *Coxendix*: from whiche holes, so soone as these Arteries are gone forth of Abdomen, they are sent to the two bodies of *Penis*, from the toppe to the lowest part, and then do they passe in bꝛanches: they beꝑng those Arteries, by whiche erection of the yard is made: whiche thyng neither hath any man noted vnto vs but *Columbus*. The remnaunt of these Arteries, is dispersed through those Muscles, whiche are put in the inside of the thighe, but they passe not the knee.

From those Arteries whiche the bleedar receineth, others also are purchased, whiche beꝑng brought to the inner part of *Os sacrum*, through whose holes they tend, both to the same, and to the *Spinnall mareꝛ*: but without, to the Muscles seruyng the thighe. Lyke as also from the great diuision of the Arterie, some issue forth, whiche with vitall bloud, do nourishe the Muscles of the thighe, whiche are within the belly situated. But of those Arteries whiche after *Os sacrum* and *Cocix* do descend, some together with certayne Veynes of *Vena cana*, do flowe to the Muscles called *Sphincter*: the whiche Arteries, may also be called *Hemorroides*.

Moreouer out of the great diuision of the great Arterie, two other Arteries spryng, whiche are reflected vptwardes, and passing through *Peritoneum*, do ascend vnder the straight Muscles about the nauell: and in many bꝛanches are ended among the Muscles of Abdomen.

In this diuision two Arteries, called *Umbelicales*, are set downe, whiche are the first Arteries that in the infant are begotten. For after that they make appaꝛaunce from the Nauell: they marche through *Peritoneum*, in what place it is double, vnto the sides of the bleedar, and doe begette these Arteries, of whiche somewhat before is sayd. But after the begynnynge of the *Umbellicall*

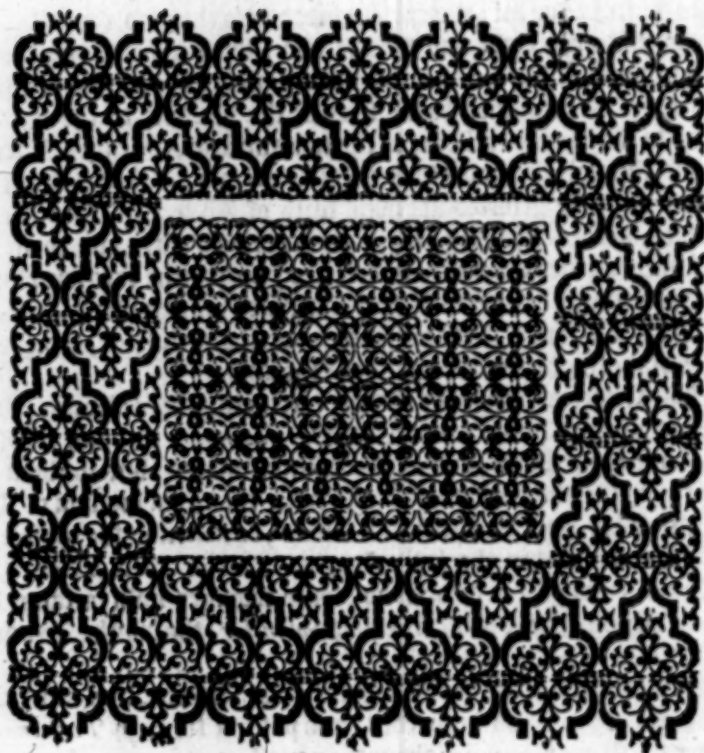
The seuenth Booke of the history of Man.

Arteries, the hart it selfe is begotten : but to returne agayne to the Vmbellicall Arteries, for of any such partes I determine not further to speake. These, after our bodies are brought to light, are dyed vp, and vsurpe the office of two Ligamentes.

But furthermore the two armes of the great trunk, whiche are caried downe into the legges, passe vnder the fist Musclic of the loynes bowyng the thigh, and goyng soth towarde Abdomen aboute *Os Ilium*, and *Pubis*, are loyned in fellowship with the inner veynes of this place, whiche marche among the Muscles. And like as those veynes are deuided: so in lyke sorte we see these Arteries to all the Muscles of the legge, foote, toes, and their extremities, disparcled. Finally, they commend their force by braunches, to the Glandes of the flanke, to the purse of the Testicles, and vnder the skinne to the yard.

Now diligent Reader note, that not the Bones them selues are destitute of Arteries, least so they should lacke vitall warmth also: without which, no part in the body lyueth.

¶ Of



of the brayne, and Instrumentes serving
to the Animall function.



Sithence to the explication of the whole History of man, there yet wanteth the fountaine of senses, and voluntary mouing, & seate of the principall part of life, by whose benefite we imagine, reason, and comit to memory: this present booke, being considered to that end, shal entreate of the brayne and his vniuersall partes, with the instrumentes of sense.

Like as therefore the substance of the hart is endued with vitall soies, and the proper flesh of the liuer with the naturall facultie of life: moreouer as the li-

uer maketh the thicker blood, and that which is caliginous, naturall spirite, at least if there be any, and the hart doth coact & mixe with vitall spirite the blood running through the body: And like as the bowels, through the conduites to them dedicated, do deuine their matters to the relief of all the partes of the body, so also the brayne obtaining fit matter to his office, by instrumentes in proper seates, and fitly ministering to his function, doth beget the Animall spirite being farre the thinnest and most excellent, which partly it beeth to the beuie function of the principall part of life: distributing part to the instrumentes of feeling and mouing continually by the nerues, neuer leauing the destitute of spirite, which of the action of those instrumentes, is supposed chief author. So lesse the liuer, & hart, doe frustrate no partes in the body (so long as man is in health) of those matters due from them, althogh not alway in like soie and qualitie.

The nerues therefore (whose originall to depend vpon the brayne we shall shortly declare) also thereto like serue as the great Arterie to the hartes, and the hollow beyne to the liuer.

For in lyke sort they deduce the prepared spirite from the brayne, to those instrumentes, to which it is continually owyng by natures commaundement, being therefore rightly iudged the diligent messengers and garders of the brayne. Which as it is the most excellent of all the partes and members in man, so is it most safely enclosed, & stately constituted, hauyng the supremacie of all the members of the body.

And although Aristotle imagined, not that to be contayned in the brayne and his facultie as is in deede, and therefore rashly assigned the constitution thereof to the cooling of the hart, and that the hart should be the author of blood and sense, yet it is most certainly otherwile, and his opinion therein easily refuted. For as in the hart the spirite is made vitall, and in the liuer naturall blood is forged to the whole body: so in the brayne is created animall power, the most noble and proper property in the whole body, as it is a part most excellent of all others.

What soeuer therefore some haue inserted to the contrary, Remains vniuersally by five notable reasons, prooueth it chief and supreme of all other member partes and offices in the body.

First is, in consideration of the noblenes of the brayne his situation, which aperly sheweth the principallite thereof above all other members, for as much as it possesseth the highest part of the body, and strongest power from all iniuries.

The second is the figure thereof, which is round, and partly long, but more rounde then long: the which figure is rarely made no where of nature the noble Aristotle.

The third reason that moueth man thereto, is to behold the strong mun-

mentes

Vesal. lib. 7. cap. 1.

Vitall spirite.

Naturall.

Animall spirite.

Use of the Animall spirite.

The nerues are the messengers of the brayne.

The primacie of the brayne.

Aristotle in error. The brayne was not made to the cooling of the hart.

The primacie of Animall spirite.

Cel. lib. 8. cap. 1.

The first reason of the primacie of the brayne.

The second reason.

The third reason.

The eight Booke of the

Which are the
propugnacies of
the brayne.

The hart is more
easily hurt then
the brayne.

The fourth rea-
son.

Cicero. Lib. 1. offic.
Wherein man
most differeth
from beasts.
VI. part. lib. 1.

The first reason.

Colin. tract. de
Fors.

What most a-
dourneth man.

The thicke and
thinne Membranes
about the brayne.

Fuchsius. cap. 2. de
Cerebro.

Dura mater con-
teth the brayne
as pincardion the
hart.

mentes and straunge defences and couerynges thereto appertaining: as first the beare, then the skinned, which there is thickest (what soeuer Aristotle saith,) then a certaine fatnes, next *Membrana carnea*, *Pericranion*, & *Periosteon*. Afterwardes the strongest of all, beyng the Scull: which is no doubt a notable fort to the noblenes, of the brayne. But this is not all, for vnder the Scull are contained two couerynges or nearer enclosures, one distant from an other, made also for the safetie of the brayne. Those Bones of the head (as in the History of Bones is largely declared) are so worthely closed and scamed together, that they can not be separated, nor the brayne hurt without exceeding violence. Either of contrary- wise to the hart appertaineth no such defence: for betwene the spaces of the ribbes, an instrument moued with small force may intercept the office and function thereof. Wherefore it playnly appeareth that nature was more careful in constituting the brayne, then in placing the hart.

The fourth reason is to consider the marvellous vse of the brayne, since it is the author of sense and mouing, without which the body were no other wise but a stocke, or dead Image, altogether destitute of sense and motion. So is it also the seate of the mynde, endued with the vertue of reason, which is the greatest signe in deede, to discerne the difference betwene man and beast, which (saith Ga- len) is an Arte before all Artes. From whence are obtained heyring, hearing, feel- lyng, tast and speach. To the which actions, what great vtilitie the brayne profe- reth, it is well to be perceived by Idiotes and foolish bodyes, who hauing defect in this, are lame in all the rest.

The first Argument he proueth by the partes and considerations of this Arte, wherof we entreate, as thus: In the generation of man the liuer is engendred, by the meanes and helpe of the umbellicall veynes, but the hart by the meanes of the umbellicall Arterie: and these, both the veyne and Arterie, spring from the bevell of the matrice, but the Serues (which to be the instrumentes of sense and motion no man doubteth) spring from the brayne of the infant which is en- gendred of the seede it selfe.

Wherefore of right the brayne is to be esteemed more noble then all other mem- bers, and as one may safely say, the kyng of all the principall partes.

Wherein is framed by a subtill kynde of operation the most precious & dayn- ty iewel which adourneth man with the greatest ornament aboue all other cre- atures, that is, the spirite animall: not sparingly reserved to some principall part, but accordyng to custome of nature, (who in her giftes is bountifull yea euen to the basest part) is fruitfully distributed, and poured vpon every part of the body, to the end they should not lye destitute of sensible action.

But before we speake fully of the function, & princely propertie of the brayne, I thinke good to speake vpon the three Membranes whiche first appeare vnto vs enuylapping the same, the one of them being without the compasse and enclosure of the Scull, and the other two within the same.

But secondly I will speake of that without the Scull, because it is produced from one of them within.

The uttermost therfore of these inner Pannicles, which in deede with in forth is next vnto the Scull, & in respect of all other Membranes either of the brayne or other partes of the body, thickest, is of the Grecians called *μαζιαρ μωριγγα*, in Latin *Crassa*, and for the excellent hardnes therof *Dura*, the hard or thicke Mem- branes: the barbarous sort call it *Dura Mater*, which in compassing the brayne a- bout, doth not gather the same straightly and closely together, but in slacke fort, and remisse order, no other wise, then after the maner that *Pericardium* inuol- ueth the hart: prouided or rather forecasted so by nature, lest otherwise the straightnes therof might yeld cause of impediment, or deprivation of his motion

in *Diastole* and *Sistole*. For though it seeme marvellous, yet it is most certaine, that not onely to the hart belongeth the same *Diastole*, and *Sistole*, but likewise to the brayne. As all such diligent Anatomistes as haue employed any trauell to the search of liuely dissections; or if selue such, yet at the least if they haue but giue a litle heede to the mouing therof in two sides of the head; that haue pearced *Cranium*, they shall cōfesse it no obscure mystery, but an euident & playne truth.

This hard Membran (sayth *Realdus Columbus* albeit no man euer before his tyme did finde it) is double, not in respect of the thickenes therof towarde all o ther Membranes in the body, but two distinct Membranes. Whereof the one inward beholding the brayne, and the other outward, next to the skull, whiche twoethly is endued with lesse sense then the other: for because it is the next, and fittest to touch the hardnes of the bones.

But the other agayne inwardly, excelleth in perfect sense. Therefore these Membranes redoubled in the toppe of the head, vnder the straight Suture discending, seperate the right part of the head from the left. Notwithstanding not so euen downe to the bottome, or lowest part, but to the halfe of the brayne; as one should say to the centre, picke, or halfe way of any rounde fashion or fourme, where the callous body is.

This doubling of the Membranes (whereof I haue made mention) in the hynder part therof towarde the brayne is more largeth before towarde the forehead. The figure therof is, after the fashion of a sickle.

But agayne in the hynder part of the head these Membranes are quadruplied, or to say playnly, *Dura Membrana* is in this place foure double, & that not in bayne: for as much as very properly in that part it deuidenth the brayne from *Cerebellum*. Betwene whiche are foure corners, or rather cavitie filled with blond, into which the inner Veynes called *Inguiales* make entrance (of whiche ingresse *Vesalius*, as one in this point indged litle diligent, was ignorant) and go forward euen to the extreme part. For that cause there is in this place no blond without the proper vessels, which if it should be (as in deede *Vesalius* deemed) *Dura Mater* might be called the begynnyng or originall of Veynes, then which, what to be more absurdely sayd or thought can not be deuised. But to retorne to the foresayd hollowes or cavitie.

Of these, the two first are placed at the seate or foundation of the brayne, where a way is made for the inner Veynes called *Inguiales*, whose entraunces are nigh the Bone of the head called *Occipitium*, and do arise vpwordes to the point of the seame called of some *Lambdoides*, and here ioyne together, that is the right with the left, and make the thyrd hollower: which marcheth forward after the whole length of the head, and endeth in the hole, which is in the toppe of the nose betwixt the forehead, and *Ossis Ischmoides*. But this thyrd hollow is not round beneath, for the sides therof are in triagled wise framed: the vpper part resemblith a halfe circle, to whose eminence and roundnes the fore part of the head geueth place, so: so both the same cavitie lye iust vnder the straight seame or Suture.

From this hollow, or rather from the veyne which we sayd to be reposed therein, very many other Veynes, both from the sides and also beneath spryng forth, which wander here and there, disperfed throughout the thinne Membran, which we will speake vpon by and by. Those also named are cut into an innumerable sorte of Veynes, by which company the whole brayne is nourished. About this hollow cavitie small Veynes also arise, whiche, to the end the Bones might be nourished, do passe through by the Sutures.

The fourth cavitie or corner of the hard Membran quadruplied, is in the betwene *Cerebrum* and *Cerebellum*: whiche place the Anatomistes call a pisse; whence the foresayd Veynes haue their rising. Weyng caried through the sub

Callosa cap. 8.
Dura mater and double
in the wayne.

Dura mater is ff.
Membranes, &
taking not knowen
to any other
mide.

Why the cere-
brum is not so
sensible as the in-
terior.

Where Dura ma-
ter is redoubled.

Where is the
figure of a sickle.

Where is the
figure of a sickle.

Where Dura mater
is ff. double and
why.

The cavitie fil-
led with blond
betwene the
four doublenes
of Dura mater.
The ingresse of
the veynes called
Inguiales.
Vesalius is lede to
an incommens.

Where are the
ff. four cavitie of
Dura mater four
doubled are.

The thirde cavitie.

The figure of the
thirde cavitie.

The rising of the
veynes disperfed
through the thinne
Membran.

By what veynes
the brayne is
nourished.

By what veynes
the bones of the
head are nour-
ished.

The fourth cavi-
tie of Dura mater
doubled & why
where is the
pisse.

The eight Booke of the

The leading of
the beynes from
the plicae.

Vesal. lib. 7. cap. 1.
How Dura mater
is tyed to the
briane.

How Dura mater
hypothesis the
briane.

The ble of the fi-
bres sent through
the leames.

How pericranium
is begotten.

Pericranium to the
skull.

Col. Loc. Cit.
Where is Pia
mater.
Chorion.
Secundina.
Where lyeth the
substance of the
briane.
The substance
of the briane and
mater is not a
like.
The figure of
the briane Pia ma-
ter taken away.
The reason of the
circumvolutions
and turnings
in the briane.
The briane hath
not this figure
for vnderstanding
like as Comodo
say.
Columb. alloweth
not this iudge-
ment of Vesalius
but affirmeth
that by beynes
that penetrate
the substance of the
briane it is now
eaten as a little
before is sayd.

stance of the briane, and through the thinn Membran whereof Cerebellum is inuolued, they shew them selues mates to the nerlike infoldes.

And albeit we haue sayd, that lyke as Pericranium in ample manner conerth the hart, thereby to geve him large scoape, for continuall pullation: so this thicke Membran to couer the briane aptly as was convenient for Diastole and Systole. Yet not so distanced from the briane, as the hart from Pericranium, whiche are not bound together at all with beynes and arteries.

But Dura Mater is tyed almost euery where, to the Pannicle that lappeth the substance of the briane, and that to no small end and vtilitie. For the braunches deriued fro the thyed cauitie of the hard Membran, with an innumerable sort on both sides; vnto the scale or substance of the thinn Membran next vnto it, do sustaine very fitly the briane suspended, so that it can not fall dolowne, to comprasse the Ventricles, so that by this meanes, the hard Membran is both to the briane an inuolment, as also an apt proppre to support and hold by the same.

To which purpose likewise, are maruelously assisstant the Fibres, that crape forth at the Sutures from the hard Membran, and fastenynge it agayne, and in like maner, to the Scull, as the thinn Membran to it with beynes and arteries: so that the briane thus secondly vpholden, the waight thereof is excellently prevented to force it to much downwarde.

Furthermore, consider that nature hath not onely sent these Fibres through the Sutures in reflected maner, as the Smith that turneth agayne the point of the nayle, but they are also encreased aboue the Scull with a maruelous dilatation, so that all mixynge together in one, do at once degenerate into a thinn Pannicle or Membran, which, because it couereth the Scull, the Grecians haue nominated *pericranium*.ouerthelesse, this is not the immediate or sole coueryng to the Scull. For vnder it consisteth yet an other thinn Membran, which is most common also to all other Bones in the body, which bewrappynge them, is therefore called by proper appellation of the Grekes *periosteum*.

But to retorne agayne to the inward Membranes of the briane, and those wherof we haue not as yet spoken:

Under *Dura Mater*, which I haue sufficiently done my part to shewe, lyeth *Pia Mater*, called also *Tenuis membra*, with which indument the briane and *Cerebellum* are neatly clad, that is close to the substance of them, it beyng of some called *Chorion*; that is to saye *Secundina*. And this thinn Membran is copiously stozed with beynes, and arteries. But vnder it lyeth, the white substance of the briane, which is soft and marey lyke, although not so, but differeth from the substance of the marey that is found in the cauities of bones not a little.

Now to come to the figure and fashion of the substance of the briane, *Pia Mater* beyng taken away, it is very like vnto the foldes of the small entrails when *Omentum* is lifted vp, that is, for the likenesse of the thyng, in that the briane, like to the guttes, seemeth to shew many infoldes and turnynges. Of whiche circumuolutions if any man enquire, the opinion of *Columbus*, is thus, that it is so made, both for the lightnes thereof, as also by the same wyndyng foldes that the briane might more easely moue in *Diastole*, and *Systole*.

Notwithstanding they are not wantyng that haue sayd the briane was made so for the cause of vnderstanding: whiche if it were so, Alles and other beastes should be reasonable creatures as is man, since they want not the lyke shape of the briane.

But *Vesalius Lib. 7. Cap. 4.* auoyding that error, and sittyng forth a more likely reason of truth, thinketh that Nature rather ordayned such foldes in the briane as a meanes of nourishment to the substance thereof: for neither is it so firme in any place, that Veynes and Arteries, as in other partes

partes of the body, may be through the same in every place scatteringly dispersed: not yet so small and slender in quantitie, that Veynes, and Arteries in the toppe onely braunchyng, are sufficient to nourish and warme the same throughout. Which provident Nature foresaying, hath engraven these cornered imple-
 yures, that in them the thinne Membran, replenished with sundry vessels, might insinuate it selfe, whereby to minister nourishment moze fitly to the substance of the brayne.

And chiefly also for the occasion of this nourishment, was the brayne in two partes dissected, that is to say, that the thinne Membran might fold it selfe in the middle thereof, and there made in reflexures, should nourish the substance of the brayne: without which division of the brayne, and deepe revolutions, that part of the brayne, whereas the right side beholdeth the left, should not be nourished. Hetherto *Vesalius*.

It seemeth certaine that Aristotle was not a little deceived in matters Anatomical, whilest he writeth that the hynder part of the head is destitute of brayne, but every man knoweth that the hinder part is not empty, and boyde, but hath and containeth therein not onely the brayne, but *Cerebellum* also.

As to come to the middest of his substance, we finde two cavities, or rather (for so are they called) ventricles, as one would say, a right, and a left, whiche are long, anfractuons or crooked, stretchyng from the anterior to the posterious part.

There are whiche call these the anterior Ventricles, but *Columbus* rather wisheth to terme them the superior: for as much as they are contained or situated above the rest. These therefore are indifferent large, and endewed with the thinne Membran: wherein is reprehended the error of *Vesalius*, for so much as he denyed the same.

Through these upper ventricles of the brayne the reticular or net like folde called *Coriformes* are carryed; whose uses doe belong to the generation of animal spirite.

Whereof *Realdus Columbus* chalengeth to him selfe, the onely and first invention after this maner. The originall begynnyng of these ventricles, is above the Bone named *Sphenoides*, towarde *Ethmoides*: but the ayre drawn by the nostrils, is conserved a space in that cavities of the forehead, or Cuneall bone, which beyng there altered, ascendeth into those two ventricles which he calleth the superior, or hypermost, and that by the holes of the bone *Ethmoides*: whereas and in whiche ventricles, by continuall labour of the brayne, and motion of the reticular fold, this ayre is mixed with the vitall spirites. And thus are the animal spirites, made of the same ayre lately prepared, and by mixing with the vitall. To this end *Galen* sayth thus, the generation of the animal spirite, hath the vitall his proper matter. Wherefore the whole brayne is contered and woven together with the division and distribution of arteries: of which, many divisions do go from the grounde, or foundation of the brayne into the Ventricles, no otherwise, then the veynes descendyng from the toppe of the head. And by these dispersed arteries, vitall spirite is effused into the ventricles of the brayne, which, by meeting & mixing with the ayre prepared, as also sayd, sogetteth the animal spirite.

The vtilitie of the animal spirites is not one, or simply to be accounted of, but is extended, and liberally bestowed upon all the senses: which beyng begot in the cavities of the brayne, discende unto the foundation or seat thereof: where the third ventricle is, whiche is a litle, long, and straight cavities, reachyng from the anterior to the posterious part of the brayne.

Not farre from this ventricle the *Perues of Spinalis Medula* do spring. Wherefore an easie matter for the animal spirites to come unto, & pearse the sinewes,

Columbus cap. cii.
 The hinder part of the head is not without brayne contrary to Aristotle.

Two Ventricles of the brayne.
 1.
 2.

Those which are called the anterior should more rightly be called the superior ventricles.

Plexus Coniformes.
 The use.

The invention of *Realdus Columbus* how the Animal spirites are begotten.

Gal. Lib. 9. v. part.
 The vitall spirite the proper matter of the Animal.

Col. Loc. cit.
 The use of the Animal spirites.

The third ventricle of the brayne.

The beginning of the nerves of the spinal marrow.

The eight Booke of the

or to be carped by them to the organs of sense to giue them helpe, and to ayde the actions of euery member, no other wise then as, being carped through the optic sinewes into the eyes, they minister vnto them the actions of seeing. In like sort as it is to be deemed of the hearing, and tastynge, and of euery action proceeding from the brayne.

But besides this thyrde ventricle thus lately spoken of, it shalbe requisite likewise to describe a fourth, which is betwene *Cerebellum* and the Spinnall marrey: in which place there is a small hole goyng from the thyrde to this fourth cavitie now spoken of, being but little, yet not so small but as may suffice the animall spirites to passe thereby from the thyrde, to the fourth Ventricle. And this is the place wherein is sayd to be contained memory.

The fourth ventricle is not much capable, and is comprehended of the thynne Membran. There the Spinnall marrey, (as shalbe sayd whē we come to the place) is enuironed with a cavitie figured like a wrytyng penne, as it were a hole, whereby no man doubteth the contained spirites may passe vnto the Spinnall marrey. Above the thyrde ventricle of the brayne, you may behold a portion supereminent, or appearing ouer it sufficiently white, whiche is called *Callosum corpus*, a Callous body. Under this lyeth an other portion named *Formix*, and *Psalloides*, in figure of a halfe circle, or rather an arche, or bending bridge: which on the hinder part leaneth as it were on two legges, but in the forepart on one onely. Neither vnp2ofitable is this body callous, or hard, or that after the fashion of a compassed arche made, but to the end that the wayght of the brayne might not ruine or fall vpon the thyrde cavitie.

But betwene these small portions of the brayne, namely the callous, & vaulted bodies, is contained as it were a glasse, so truly called, because it is cleare and cristall lyke, being nothyng els in this place but the thynne Membran of the brayne here doubled: with which duplication of thynne Membran, the superiour ventricles are enuironed, which thence returne downwarde. Whereto if this glasse were wantyng, it were not euidēt how the right Ventricle should from the left be discerned, and called: forasmuch as by the meanes and helpe of this onely Membran, they are deuided.

Behynd this vaulted part in the extreme part of the brayne towardes *Cerebellum*, and in the vpper part of the thyrde ventricle, Nature hath seyned certaine eminent partes, whiche in their vpper partes, represent the likenes of Image of Testicles, and so called therfore of Anathomistes *Testes*: neare vnto the which, two other particles yet somewhat greater are to be discerned, called according to their figure clunes, the haunches or buttockes. Betwene which lyeth that hole, whiche is already noted to from the thyrde, to the fourth ventricle, and seemeth like vnto the fundament. Furthermore in the forepart of these Testicles (as we call them) stretchyng to the thyrde ventricle, an other part of the brayne appeareth, which not vnaptly, but very elegantly expresseth the shape or priuie part of a woman. With this body is sene a litle hard Glandule, in colour contrary to the substance of the brayne, that is to say, somewhat yelow, couered with the thynne Membran.

This Glandule is called *Pinealis*, or *Conarium*, fitly representing the shape of the yarde. So that in the brayne wanteth neither the figure of the Testicles, buttockes, fundament, womans shape, nor yarde. The vse of this Glandule *Columbus* holdeth opinion to be for the diuision of the vessell: other some haue conjectured that the making and office therof was, to shut in the spirite of the fourth ventricle, but that he alloweth not. Galen sayth, that it hath in this place the same office that others in other partes of the body possesse: but it filleth (sayth he) the diuision of the great beyne wherewith all the foldes *Choroides*, that are in the anterior

The fourth ventricle of the brayne where. The way of the Animall spirites from the third to the fourth ventricle. The place of memory. The cavitie in the Spinnall marrey like a wrytyng penne.

The callous body. The arche or vaulted place.

The vse of the callous body and vaulted place.

The glasse in the brayne what it is where, and of what vse. The vse of Pinealis doubled.

The testicles in the brayne.

The haunches or buttockes in the brayne.

The hole like the fundament.

The image of a womans priuie in the brayne.

Glandula Pinealis. The yarde in the brayne.

The vse of Glandula pinealis. The error of Anathomistes in the vse of Glandula pinealis. Columbus Ibid.

terior ventricles of the brayne, are filled. In the forepart of the third ventricle is to be discerned a deeper cavitie, which goeth at length aboue the seate of *Sphenoides*, and this cavitie is called *Peluis*, or *Infundibulum*, which is to be Englished a tunnell or hopper made to receiue the excrementes begotten in the ventricles, and transmit, and carie them to the Glandule placed in the seate of *Sphenoides*. Whiche Glandule in deede is sufficiently thicke, beyng put without the hard Membrans, framed so of the deane workman to receiue into it the excrementes of the brayne. And this *Columbus* affirmeth to be the place, where the thinne Membran riseth to couer and clothe these ventricles.

The conell where it is and the use thereof.

And notwithstanding all this sayd, yet before we cease or giue ouer the description of the brayne, note thus much, that in the brayne and whole substance therof onely foure cavitiees or holloies are to be numbred, and more, or besides them none, (sayth the same *Replidus*), although some haue affirmed by the cause of whiche error is the anfractuons or crooked deduction of the first y. ventricles, whiche they haue not diligently persecuted or followed forth to the end, but impudently haue daied by that meanes, two other ventricles to be contained in the forepart: which certainly are nothing els but a portion of the first.

Onely iiii. ventricles in the brayne. Why some Anatomists haue imagined y. ventricles.

Now the discourse of the brayne, beyng sufficiently handled, it seemeth necessary consequently to speake of *Cerebellum*. *Cerebellum* whiche hath his place forwarde the hinder part of the Scull vnder the hard Membrans: of which, as also of the thinne Membran it is compassed on eche side: notwithstanding that his circinuations, and turnynges, or wreathes are not the same, but otherwise then we haue noted of the braynes. And this part (sayth *Iohannes Fernelius Ambianus*) is much harder then the substance of that we call the brayne, and therfore produceth harder sinewes, and also (sayth he) it is more dry: wherof the extreme part falleth downe the hollow pipe, or caue of the spine or backe Bones, euen vnto *Os sacrum*: but he seemeth in this to subscribe vnto Galen, who sayth, that the end of *Cerebellum* is the begynnyng of the Spinall marey, & for that cause it is the harder, that to all the hard sinewes of the body, it might be a begynnyng: for as much as from this hinder part of the brayne, no soft sinew is produced.

Of Cerebellum.

Situation.

Indument.

Circinulations.

Iho. Fern. cap. ix. Substance.

Fernelius assertion according to Galen.

But notwithstanding that these be the wordes of Galen and Fernelius, two famous men in Philosophicall discipline, yet as men not retainyng the whole summe and scope of Arte to them selues (for so had neuer man that lyued yet) their wordes are not as Gospell in all thynges: to this I say therfore with *Realidus Columbus* that the substance of *Cerebellum* is not hard, but with his turnyngs at length endeth downeward in two Processes: the figure of whiche is like the white and short wormes found in rotten wood: whose vse is to prohibite, least of the fourth ventricle, pressed by the waight of *Cerebellum*, the substance should be stopped. And wherof Galen thought that from this *Cerebellum* came harder sinewes, the from the brayne, the truth is (sayth *Columbus*) that there hence proceedeth not one payre, nor one at all: wherein to be sure, he purposely marked many tymes and oft: neither is the substance thereof any thyng harder at all, then of the brayne.

Of the substance of Cerebellum contrary to Galen.

Columb. Loc. cit.

The wormes in Cerebellum and their vse.

No payre of sinewes springeth from Cerebellum contrary to Galen. The substance of Cerebellum is not harder then of the brayne. Wherem the nobleness of the brayne is most playnly argued.

Thus farre we haue spoken of the matter and substance of the brayne. But to speake further of the principallitie of his functions, and to argue more playnly the nobleness of his nature, by explication of the sundry benefites he yeldeth throughout the frame of the body, behold but the organs of smellyng, hearing, and seeing: with tast, and feeling: as also how much he maketh to the motion of members, in streiuyng such an infinite number of sinewes throughout the body, and partes therof, without the which, no other could be coniectured of the lyfe of man. Then is to be discerned by trees and spredying plantes: which onely

How man differeth most from growing places.

The eight Booke of the

How much more exquisite are the sense in man than in other creatures.

The first of the common sense called smelling. Col. Cap. 2. Lib. 8. The ending of the Mamillae processes.

Progressive.

Ending.

Use. Iohannes Fernel. Lib. 1. cap. ix. Galen Lib. 9. & 11. de vi. part. How hapneth dignation of sinners.

Why the Nerves in the organs of smelling are not hard.

Fernel. Ibid.

The second use of the organs of smelling.

The division of hedge of the nose.

Galen Ibid. Of the organs of hearing Substance.

Fernel. Ibid.

Galen. 11. Lib. vi. part. Fernel. Ibid. How hearing hapneth read more elegantly in the history of bones. & namely where the offices of the organ of hearing are described.

flourish in growyng, and frutage, but boode of sense, sight, hearing, taste, moving, and smelling: whiche are chiefly in the body of man most notable aboue all other creatures, by so much the more, by how much the brayne in man, is different fro all other creatures.

To go forward therefore in the description of these aforesayd organs, first you shall note that in the forepart of the brayne about the seate or foundation therof, the rising of two organs are playne to be discerned, which the Grecians call *Olfactilia*, but other Anathomistes *Processus Mamillares*: whiche are long, and small, consistyng of the substance of the brayne it selfe, onely intolued with the thynne Membran. Betwene the brayne, *Os Sphenoides*, and *Os frontis*, these organs are caried: aboue which the hard Membranes are to be discerned, of which we haue spoken before.

Thus the organs of smelling do cease at two litle thicke partes, and those agayne in the Bone called *Ethmoides*, at the side of a certayne eminent Processe therof. So that of the breath that we draw at our nostrils, part ascendyng by by the nostrils into these sayd litle holes (for so saith *Fernelius*.) part of the breath receiued passeth this way into the brayne, and the rest into *Trachea Arteria* we distinguish and finde out the differences, of good and euill saouours.

The which proper organ, to the end it might not haue lightly default in operation, but retayne his vertue more effectually, Nature hath produced in places mentioned, neare to the Processe lately spoken of, two portions of soft sinewes: not of auncient Anathomistes therefore called sinewes, but we terme them so, since, by their rare tendernes, they are the fitter for this purpose to discern the differences of ayre brought vnto them: which to bene hard, no man would iudge it by reason so fit: since they support a more subtile sense, then any other partes in the whole body.

Agayne, a double commoditie is found by these sayd organs. For besides that they thus present all saouours good and euill, vnto the brayne, so do they also, and in like maner, receiue the filthy and stinky excrementes purged from the Anterior, or vpper Ventracles of the brayne.

To these nostrils appertaine a certayne Cartilaginous substance, whiche in the midst of them maketh a severall diuision, or hedge: called therefore *Narium septum*, or *Interseptum Cartilagineum*, stretched from the bottome, to the top of the nose: as also to the vpper partes of the palate: for all that region, or part, is replete, with holes, & hollowes, to receiue the sayd superfluities of the brayne.

The eares beyng in like sort the organs of hearing, are sited in the extreme partes of the temples, of whiche the outward partes are called *Auriculae*. The substance of the eares are Cartilaginous or grissely, and not rashly so ordeined, for asmuch as thereby the entraunces or passages are made, not onely easier, but also (which is notable) continually open, and prest to receiue the sound of euery speach, or other noyse. Therefore *Dura Membrana*, or the thicker coveyryng in clothynge and enuoyppynge the deepest corner or wyndyng of the eares, & certayne soft sinew is brought thereto on eche side, from the fist coniungation of the brayne, obiected to the holes transuersely, or ouerthwart: whiche receiuyng the ayre of any sounde, carryeth and presenteth it vnto the brayne, the notable & common begynnynge of sense.

Thus haue I sayd how smelling and hearing take effect in the head, and by what meanes the brayne hath knowledge of both. So in lyke maner you shall here how the noble organs of sight, which to the whole body are to be compared as the Sunne vnto the world, are situated in the head, and how with diuers aydes, they obtaine their action.

The

The eyes therefore are assistant on both sides, the most deliſing and precious partes in the body: which no otherwiſe then circumspect ſpialls in a forte, that watche the uppermoſt tower, to behold a farre of and give warning of their enemies: ſo the eyes are ſited in a moſt highe place, the rather to eſpye, and diſcryp thynges pleaſaunt, or otherwiſe hurtfull to the body. *Fernelius* reporteth, taking his authoritie (as he ſayth) from *Galen*, that for cauſe of the eyes, the head was appointed in the higheſt place of the body, becauſe the brayne, for the ſhortnes of the ſinewes opticke, ſtoode in neede to be ſituate ſo neare the eyes. But ſuch reaſons are not diſputed on, ſince the brayne to haue his ſaſteſt being a loſt, and eyes there moſt ſightly ſeate in the head, no man iudgeth raſhnes or improuidence, not onely becauſe nothing may be amiſſe, that is wrought by the omnipotent creator, but alſo ſo farre as the ſame in the weake iudgement of worſholinges, ſeemeth ſo notable, as the thyng, which, otherwiſe then ſo, could not haue bene the lyke.

Therefore if in marking the ſituation of the eyes, you retayne but ſome ſcruple of diligence: no doubt, but as you ſinde how excellently Nature hath engrauen in the head and uppermoſt iawe two proper celles or caviities for their habitation, ſo will it (eue as it were) raviſh your ſenſes, to conſider how many mete defences and propugnacles are placed round about their cavitie. Which albeit they haue to them ſelues proper uſes appointed, yet ſerue they beſides ſo fit for to gard the eyes, as if they had bene for no other purpoſe ordained. For above them is *Oſ frontis* and the eye browe, beneath, the firſt bone of the upper iawe, the bones of the cheeke, likewiſe the noſtreils, and *Oſ ingale*: beſides the griſtles of the liddes, and the eyeliddes themſelues, which ſerue to direct the ſight.

The faſhion of the eyes in man is rounde: which if you marke well, you ſhall ſinde that nothing elles in the body hath a direct rounde proportion. But in other creatures the eyes are not directly round, no, rather oblique or deprefled. Neither is that marueilous, whileſt the figure of man differeth from all other creatures in no ſmall poynt. Neither more openly, then worſthely, hath *Realduſ Columbus* reproved ſuch as hitherto haue made deſcription of the eyes, by frequentation of byutiſh Anatomies: which clearly he noteth in *Galen*, and after him *Veſalius*, whoſe ſkilfulnes in matters Anatomicall no man neglecteth: yet with no ſmall negligēce is he ſpotted in this point, ſince, ſo careleſly to write in a matter ſo great, excellent, and oft wiſhed he bluſhed not.

But now to come to the matter, in what place the eye is ſited, and for what cauſe, that is to ſay, for ſight, no man doubteth, but how the ſight is made, that is not with facilitie explicable: the ſtriſe therof as yet is vnder iudgement, as touching emission, and immiſſion. Some thingyng to haue obtained truth on their ſide, are confuted with the fancyes of their owne ſolliſhe ſabylng. So that one ſo much hindreth an other, as when reaſon ſhould give iudgement, conceyt ſtandeth in the light: but of this argument we will make no diſputation. It is ſufficient in this treatiſe, to ſhew that the eyes are made for the cauſe of ſeyng. Which thyng is ſo marueilous neceſſary to man as they that either by nature, chaunce, or ſicknes, loſe there ſight, accompt them ſelues unhappy.

The facultie of ſeyng cometh from the brayne, brought vnto them from the viſible ſpirites by the opticke ſinewes, which ſinewes are thicke and ſoft (as ſhalbe declared when we come to the deſcription of ſinewes) entwapped with the hard and ſoft Membran, and ſpyng out from within the brayne, to the ſeate or foundation thereof: and penetrating *Oſ ſphenoides* through the rounde holes therof, do end in the inner cavitie of the eyes, whereas they conſtitute the Membran called *αμφιβλαſτροειδης*.

The eyes therefore conſiſt of many partes, that is to ſay of ſixe Muſcles, not

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with.

Of the organs of ſeeing.

Situation.

Fernel. lib. d.

Columbus. lib. x.

Which and how many are the propugnacles of the eyes.

The eye liddes direct the ſight. The faſhion of the eye in man.

Realduſ Columbus reprehendeth all that write of the eyes before his time. *Galen* and *veſalius* were deceiued in the workmanſhip of the eye.

How viſion is made is a difficult queſtion.

The blind thinke them ſelues unhappy.

Whence is the facultie of ſeeing. Of what ſubſtance are the opticke ſinewes. Inuolucres. Membranes. Infection. What doth conſtitute the membran called Amphiſtroides or Retina.

The eight Booke of the

Of what partes
the eye of man
doth consist.

Of the muscles of
the eyes.
The foure first
muscles.
The rising
fibres.

Insertion.
The vse of euery
of these iiii.
muscles.

Col. Loc. cit.
The vse of the
foure muscles la-
bouring together.

The vse of the
foure muscles
successiuely mo-
uing.

We compareth
these foure mus-
cles to the mus-
cles of the wrist,
as touching their
vse.

The first muscle of
the eyes Realdus
Columbus first in-
uented.

Quid. lib. i. Met.

The vse of this
first muscle.

Whence the diffen-
tion of authors
as touching the
muscles of the
eyes is playnly
set forth.
The second paye
of Anatomic of the
eye is inserted
among the mus-
cles of the eyes.

withstandyng that Galen and *Vesalius* are of much contrary opinion, as in the History of Muscles is playnly set out: five Membrans, and three humours: with Perues, Arteries, Veines, Glandules, and much fatnes round about.

Of the Muscles seruyng to the eyes, whiche we haue sayd to be five, foure of them are so disposed, as that they seeme to be distributed to the foure corners of the eyes, aboue and beneath, to the right side and to the left. Their rising is from *Os sphenoides*, and *Dura mater*, and are long, consistyng of straight Fibres: and in their endes explicatyng their owne substance, do constitute a tendinous Membran, which endeth at the pannicle *Cornea*, behynd *Iris*: euery which Muscle do- yng his office by him selfe, and labouryng without the helpe of the rest, brayeth the eye either vpiward, or downeward, to the right hand, or to the left: but if at one tyme in mouyng, they go together, then they hold or stay the eye: but agayne at what tyme they vse not their motion all at once, but one of the successiue after another, the eye is turned round, or in compasse wise. Which diuersitie of mo- uynge at vnlike tyme, is also to be sene in the foure Muscles addiued to the mo- uynge of the wrist. Wherefore, diuerse motions to be shewed by diuerse mouers and that in them selues diuersly, let no man thincke it an absurditie to beleue.

But now to come to the first Muscle, wherof *Realdus Columbus* protesteth him selfe to be the first inuentor: it amplecteth, or embraseth the halfe and more of the eyes, in transuerse maner sited: neuerthelesse, is not to be despised or with slight regarde beholden, since the motion therof is not onely exquisite, but accor- dyng to the prouidence of God ordained, whereby the countenance of man, is different from beastes: as the Poet hath versified.

*Pronaque cum spectant animalia cetera terram,
Os homini sublime dedit, calumque videre
Iussit, & erectos ad sidera tollere vultus.*

When euery beast, with prone aspect, to looke on earthy mould,
He had ordained, yet man he made, the heauens for to behould:
And that he should his countenance vnto the skyes erect.

So by the benefite of this first Muscle we behold the heauens, and directly cast our countenance vpiward. By it so is made perfect the deuise of so great a worke begon, which serueth and helpeth at euery turne. For not onely the eye may be lifted vp by this Muscle, but be likewise stayed: as also turned round, or agayne contained in his seate vnmoueable still, or steadfast, without turnyng this way or that way.

Wherefore I am in this opinion further perswaded, that Nature with great foresight, and prouident skill, gaue vnto the eyes this first Muscle, participatyng with the proprietie of euery action: & placed it so closely, & nearly wappynge, or claspynge the hinder side of the eye (as the like she hath done to other partes, whose offices are notable) that if the Muscles of the corners, that is the other foure, or any of them should by outward inconuenience, and hurt, be dispoyled of their vertues, this (which by Nature is sited so secretly, that as it is a hand vnto the eye, so the eye is a shield vnto it, so that the one can not be rightly hurt, and the other escape) might minister assistance, least the eye thence forth should be depri- ued of mouyng altogether.

The other Anatomistes, I meane, such as haue written befoze the tyme of *Realdus Columbus*, how they haue varryed from him in the description of the Mus- cles of the eyes, I haue most diligently, and directly, in the History of Muscles declared. We ought yet in discussing the frame of the bodies light, further to con- sider: for amongst these Muscles are distributed the secon paye of sinewes from
the

the bzayne: amongst which, the eye, and opticke sinew, a great portion of fat is placed, least that by want of such moystnyng, as it yeldeth, the eye, in perpetuall mooung might dry and consume. Hereto also are ioyned ii. Glandules, of which the one aboue, and the other beneath, pouryng forth teares in a perplexed mynde, are made also to water and moysten the eyes the better.

But this sayd, to speake of the manifold Membranes of the eyes, they are sixe in number.

The first of them is the outmost, and hath many names, as all these, *Adnata*, *alba*, *adherens*, and *coniunctiua*: it is a Pannicle thynne, and white, takyng his begynnyng from *Pericranium*, and endes at the greater circle of *Iris*: for *Iris* is that circle in the eye replenished with diuers colours: which varietie of colours, proceedeth not through the humors therein closed, but *Vnea membrana*, the which *Vnea* is not in all persos of like colour, but in some blacker, in some more white, in some blein, &c.

The name of *Iris* is taken of the similitude of the raynebowe in the firmament, so diuersly coloured. But that which you see in the centre, or middle picket of the eye is named *Pupilla*, oft called in English the apple of the eye: by the benefit and office whereof, we haue sight.

And notwithstanding that the same *Pupilla* appeareth blacke, yet nether it, nor any thyng vnder it (as sayth *Collubus*) is blacke at all, but most perfect bright and shynyng: albeit I dare not subscribe to him in that.

But as in the contrarietie of opinions, when as every affection throtweth a bzade, truth hides her head, whilest reason hath inough to do to defend him selfe: maketh some, not of the simplest Anathomistes, to hold in, and pause in diuers of their discourses: so some agayne, not regardyng what others affirme, their olone eyes beyng witnesses (though I deny not, the rest to haue used dissections, perhaps yet not so oft, in this respect vpon the body of man) haue playnly without bawkyng depainted their iudgements, vpon such inuentions, as experience hath found them.

For albeit Galen and *Vesalius*, haue described the eyes farre other wise, *Realdus Collumbus* (nothyng terrified with the face of their authoritie) hath auouched contrary to all their myndes nether more, nor one lesse then sixe Membranes.

Of which, the second in number that he reciteth neuer any found before him, and therfore goeth vnnamed. This sayth he is begotten of a certaine kynde of sinewy thinnes of the Muscles of the eyes, and lying vnder the tunicle called *Adnata*, or *coniunctiua*, before spoken of, is ended neare vnto *Iris*.

The third Membran is called in Greeke *κερατοειδης*, in Latin *Cornea*, and of some *Dura*: so called, for that in cuttyng it is like to a horne, but that it forceth not: in hard it is both hard, and thicke, springyng from *Dura Mater* it selfe. Through this Membran *Ceratoides*, the fashion of the eye is constituted. Nether hath it more, then one originall roote, or rising: whiche perhaps hath bene the cause of error in others, accomptyng the forepart therof *Cornea*, for that it shyneth like a horne: and the hinder part *Sclerofica*, onely for the hardnes thereof. Whereas it is one onely, and not two, brought from *Dura Membrana*, as I sayd before. *Ceratoides* in the forepart therof is bright, & shynyng, and therewith subtil and smal, in which place *Iris* and *Pupilla* is sited: this stayeth the eye, & clotheth both the opticke sinew, and the eye: beyng within halloze, containyng likewise three humors, and three other Membranes.

Now to the fourth Membran of the eye, which is called *Vnea*, and *Chorion*, *Secundana*, and *Choriformis*, springyng from the thynne Membran of the bzayne, and is the first that clotheth the opticke sinew: after dilatyng further vnder *Cornea*, stretcheth forth vnto the forepart. Yet for all that, it doth not entwappe the eye

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all

The vse of fatte to the eyes.

The situation and vse of the glandules in the eyes. Teares whence they spring. Of the membranes of the eyes.

The names of the first membra of the eye. The description of the membran Coniunctiua. What is Iris in the eye. Vnea is not in every one of like colour. The etimologie of Iris in the eye. Pupilla of the apple of the eye which is it.

Vesal. cap. 9. de arg. fac. animal.

The second membran vnnamed to other Anathomistes. The beginning and insertion of this second membran.

Ceratoides. Galen 10. v. part. Fuch. cap. 10. Fernel. cap. 1. li. 5. *Ceratoides* constituteth the fashion of the eye. The error of the Arabians in the membran *Cornea*. *Cornea* is one onely. *Cornea* what kind of one. The beauties of the membran *Cornea*.

The names of the fourth membran of the eye. Beginning. Progress. Insertion.

The eight Booke of the

The fourth mem-
bran enuappeth
not all the eye.
Where the fourth
Membran is
double.

The humologie of
the Membran
Vnea.

Diuers colours
in Vnea in man.

The colours of
Vnea in an eye are
more then in man.

The vse of the
varietie of colour.
Why the eyes
being weary we
winke.

The first membra
called Retina.

The beginning
and substance of
Retina.

The situation of
Vnea.

The first Mem-
bra called Aranea.

Beginning.
Whereto Aranea
is compared.

The vse of the first
Membran.

Col. Loc. cit.
Vesalius ob scur-
in the Membran
Aranea.

Vesalius lib. 7. cap. 14.
The Membran
like eye lides

which Vesalius
mentioneth is
not any thing
distinct from the
Membrana hi-
thero described.

Of the humours of
the eye.

Galen. vi. part. 10.
The place of the
watric humor.

Columbus lib.
Where are sus-
sions made called

Charactes.

The watric hu-
mor is an excre-
ment.

The watric hu-
mor being effused
may renate or
grow agayne.

The second humor
of the eye why it
is called the
crystalline.

Situation.

The figure of the
crystalline hu-
mor.

all about as *Cornea* is sayd to do. But after it hath come to the apple of the eye, which this same *Vnea* fashioned, and maketh, it is reflected towards the hynder part, and marcheth forth to the beginning of *Iris*, and there is made two fold or double, and departeth from *Cornea* all that space that is so cleare and cristall like: although in other partes agayne it is not a litle knit thereto. It beareth the name *Vnea*, for that the grayne therof representeth a grape, the stalk taken away. In this point (as I sayd) that is, as touching the coulours of this *Vnea*, great diuersitie is in creatures to be discerned, yea in man him selfe. For *Vnea* in man is blacke in colour, red, blew, and yellowish: but in an *Ore*, besides those colours, also greene, and bright, blew. By the which varietie of colours the weyered eyes are recreated, & therfore we shut the eyes, to the ende that after quiet resolt of the visibill spiritus, these colours may newly be refreshed.

The first Membran of the eye is called *Amphiblastroides*, in *Latino Retina*, chosen of the very substance of the visibill *Serue*. Wherefore if we properly, and more directly should speake therof, it is not a Membran, but in very dede a thyng soft and white: which if you do behold precisely together with the substance of the brayne, you will rather deeme it the substance of the brayne then otherwise. This lyeth more inwardly then doth *Vnea*, and a litle further marcheth forward to the halfe part of the eye.

The first Membran, called *ἀραξοειδής*, in *Latin Aranea*, for that it seemeth to represent a Spiders webb, sprynges in like sort from the thinne Membran, beyng of it selfe most thinne and splendent: not farre vnlke the thinne pellicle founde, vnder the rinde of an onion, whose vse is to complex, and retayne the glassie, and cristalline humours.

Herein the great Anatomist *Vesalius* seemed perplexed of sense, in his description of the copweblike Membran. Yet ouer rashly made diuision thereof, not knowyng that therein was enclosed the glassie humor. Galen is no lesse reproued, in so much as he separated it from that whiche is sited before the cristalline humor. Which *Columbus* affirmeth to be onely one: although the part whiche is sayd to be placed before the cristalline humor, be a litle thicker then in other partes. And these are supposed to be the true Membranes of the eyes. *Vesalius* notwithstanding harped vpon a seventh, like the evelyddes, which should be put betwene the glassie and watric humor. But notwithstanding in dede that those lines, which close about the cristalline humor, are in *Aranea*, as before we haue writte.

After these it followeth fitly to speake vpon the thre humours necessarily appertaining to the eyes. That is to say, the watric, cristalline, & glassie. Amongest which, the watric is placed (beyng so of Galen called, for his substance and colour representyng the white watric part of an egge) betwene the Membran called *Vnea* (where it is made double and inuerfed) and that which is called *Cornea*. Whiche humor is not much in quantitie: and therein suspensions are made, which the younger sort haue called *Cataractes*. This, *Columbus* proueth to be an excrement, for that tyme he had sene it effused, through woundes, and yet in space renated or sprong agayne, so as the partie sustained the losse of no eye. To which I saythfully subscribe, hauyng proued the like in *Anno. 1570*. But to returne to our matter.

The second humor of the eye is *Christalloides*, or *Christallinus*, called so, for because it shineth like light, and in pure clearenes comparable to the cristall. The place where it is sited is towards the forepartes, almost in the centre of the eye, beyng amplexed on the hynder part with the vitricus humor, hauyng no other Membran interiarent or lyeng betwene: but before couered with *Aranea*. The figure of the cristalline humor is round, but in the fore part depressed: where it respecteth the watric humor, it is lyke the kynde of a pulle called a lentill. The

sub.

substance, of this humor is somewhat hard. The use thereof is excellent & most noble: being almost the principall member of sight, pleasant to be marked, and worthy to be knowen, not iniuriously therefore called the idole, or Image of seeing. Now the third humor called *Hialoides*, of all sorters of Anatomistes *Vitreum*, because it representeth fused or molten glasse. The place of being, whereof is in the hinder part of the eye. Yet not onely holdeth his abode there, but holdeth no small portion also of the forepart, as appeareth, since of foure partes of the eye it is sayd to occupie thre: I meane the hollow part. Besides all this *Hialoides* is hollow in the middelt for good purpose, giuing place vnto the chryselline humor: being likewise of it selfe most splendent and pleasant to behold. *Arauea* enuappeth this together with the chryselline humor, neare to which *Retina* lyeth, which yeldeth nourishment to the vitreous humor, which vitreous in like maner feedeth the chryselline. Therefore no maruelle that the vitreous humor shineth so excellently, being the nourisher and feeder of the chryselline more shining. So that by meanes of renewing these nutricions, that humour is also ingendred, which is called *Aquens* or watrishe, of Galen *Allagimium*, for the cause before named. And these are the three humors in the eyes, helppng or rather ministering sight: for by their helpe, and by meanes of their round proportion, with the centre in the middelt, and their decent situation, with such visible space betwene, we easely and rightly see. Besides the five Muscles seruing to the eye, as also besides the vi. Membrans, three humors two Glandules, the opticke sinew, the second payre of sinewes, and fat (all which I haue sufficiently in this discourse distributed) there are both Veynes and Arteries, dispersed through the Muscles, fat, and Membrans, among whiche many of them are distributed, as also through *Cornea* and *Vnea*.

This is the most proper explication that I can gather of the frame and workmanshipp of mans eye: to speake playnly and without paynted circumstances, least I might happen to fall within the danger of soule obloquie with *Vesalius*, who is sayd not onely in the Muscles and Membrans to haue erred, but euen in the humors also to haue wandred out of the way, supposing the chryselline humor to be exquisitely sited in the centre of the eye, as also the quantitie of the watrishe to be equall with the vitreous humor.

Hitherto of smelling, hearing, and seeing. Now of tastng, whose chiefest instrumentes (sayth *Iouannes Fernelius* in his 11. Chap. *De partibus corporis humani*) are in the palate and toung, although the toung (as saith *Vesalius*) by the consent of all Philosophers, is the principall. Which office it purchaseth by reason of the two braunches of the foure payre of sinewes of the brayne, which descending to the rootes of the toung, are distributed through the vpper coate of it. The other two braunches of the same payre passing through the holes of the fourth Bone of the vpper iawe, march through the coate of the palate, to the Anterior part thereof.

And thus these foure payre (sayth *Columbus*) were begotten to be the organ of tast. As for the vertue of feeling, which is equally poured out amby all the partes of the body, I can not define the proper instrumentes thereof, vntill the propagation of Nerves be absolued, to which Nature resigned the whole libertie of feeling and moung: that worthely, they might be derided, who affirme one portion of an Nerve to be endewed with feeling, and another with moung and without sense.

But before I fall to the particular description of Nerves, it may be demaunded what a nerve is: it is answered, that a sinew is an organ, by the which both sense and moung is caried vnto the whole body. Which maketh that such partes as are voyde of them, are no lesse frustrate of sense.

Pliny.

Galen

The substance of the chryselline humor.

The use of the chryselline humor.

The Etimologie of the name of the glasse humor of the eye.

Formation of the vitreous humor. Why the vitreous humor is hollowed.

Retina nourisheth the vitreous humor, the vitreous nourisheth the chryselline humor.

How the watrishe humor is begotten.

Gal. 1. 1. part. 1. 10.

The Epilogue of the partes of the eye, and seruing to the eye.

Peroration.

Col. Loc. cit. *Vesalius* erreth in the history of the eye.

Of the sense of tastng.

The tongue the chiefe instrument of tast and how. The foure payres of sinewes seruing to the organ of taste.

Of the sense of feeling.

They are bad in decision that affirme one nerve for feeling, and other for moung.

What a nerve is.

The eight Booke of the

Lib. 8. de. 1. part.
Why nature
made such distri-
bution of nerues.

Why nature gi-
ueth not to every
part like portion
of nerues.

Columb. lib. 1.
The figure of the
nerue.
Substance.
The nerue is
clothed with dura
and Pia mater.
The originale of
nerues.

The nerues of
the brayne haue
beene euery deui-
ded into viij.
payres

The first payre of
nerues of the
brayne.
Substance.
Beginning.

Inuolucere.

The histologie of
the name of the
first payre.
In the optike
nerue is no pore.
The pure spi-
rites may passe
through the rare
substance of the
optike nerues.

Of the second
payre of the brayne.
Situation
Diagonelle and
vsc.

The temporall
muscle hurt the
eye is hurt by
consent and con-
trarietie.

The third payre
with diuision and
vsc.

Galen sayth that for thre principall endes Nature hath made such distri-
bution of Nerues in the body. The first was to giue feeling vnto the sensue instru-
mentes, the second to giue motion to the moueable partes, and the third to endue
all others with that facultie, whereby to discern all annoyances. Albeit that to
the Muscles being the instrumentes of voluntary mouing the greatest Nerues
are giuen therfore, in this consideration nature hath not distributed to euery part
like measure of Nerues, to one as to an other: but to some more liberally, and a-
gayne to others more sparingly. Euen as appeareth by the members of nutrition,
whilst none of them are instrumentes either of sense, or motion. Nature hath
giuen them therfore small Nerues, onely to be partakers of the sense of know-
ledge in any paynfull annoyances.

The figure of a Nerue is long and of round proportion, of substance soft, and
porie also, to giue perfect passage to the animall spirites effused among the partes.
And this substance of the nerues is endued with the slender, as also the thicke
Membran of the brayne, to be of more abilitie.

Their distribution is diuers, but their originall is from the seate or founda-
tion of the brayne, neare to the third Ventricle: from whence they spring, both
to the right side and to the left. And for asmuch as all that hitherto haue written
of them, do describe their proceedinges by payres, whiche are in number viij. in
which point there is not one of them that differ from an other (although in other
cases but seldome may we say so.) we will also in this present discourse obserue
the like order, as touching the viij. payres of sinewes of the brayne.

And to begyn, the first of them therfore are indifferent thicke, and also soft,
whole rising is somewhat distant from the anterior seate of the brayne, where-
as, about the cell of the bone called *Sphenoides*, they are united: but not crossewise,
as some haue dreamed. For whereas they ioyne together a litle space, they sepa-
rate agayne shortly, the right one passing to the right eye, and the left, vnto the
left eye. But note a litle as touching their inuolucres, for from their beginning
lately noted, to the hole sited in the roundell of the eye, through which they passe,
they are onely belapped with the thinne Membran: but from thence to the eye,
in which they end, and make the also sayd Membran called *Retina*, in that space (I
say) they are enurapped both with the thinne, and also the hard Membrans.

These are called *Nervi optici*, that is, the visible sinewes, & that because they
bring the vertue visible vnto the eyes. They do consist of a spongy substance of
the brayne, but not manifestly replete with pores as some say: yet not to be de-
nied (since their substance is both rare and also soft) but that they prepare passage
for the purest spirites. And thus much of the first payre of sinewes.

The second payre of sinewes is brought through their proper holes, & through
a rift or chinke of the roundell of the eye, to the five Muscles seruyng to the eye,
and to those two that open the eyelid: besides that they send yet further (in some)
a braunche into the temporall Muscle: whereby in daede many tymes it happe-
neth, that by the hurt of the Muscle of the temple, the eye also is hurt, as it were
by consent: and so agayne on the contrary part.

The third payre of sinewes rising more backwardes, & as it were sidewayes,
hath two beginninges, wherof the one is greater, the other lesser: this payre per-
ceth the scalpe, and descendyng downewardes by the same hole which is not onely
comon to this, but likewise to the fourth coniugation of sinewes, is cut into ma-
ny braunches, whose distribution therfore is very diuerse. For the one braunche
creepeth to the temporall Muscle, the other to the roundell of the eye, and through
the eye brow to the forehead, as also to the Muscle that closeth the eyelid, like-
wise to the Muscle that delateth the nose, and to the nose besides procreateth an
infinite number of braunches. An other braunche of this third coniugation of Ner-
ues

ues taketh also the way through the roundell of the eye, but lower. It passeth downewardest by the thyrd bone of the vpper iawe, through that hole whiche is placed about the middle part of the face, as shall readely arise in the porte of remembraunce by readyng the description of bones: to the which place when thus (as I said) it hath brought it selfe, it is there further devided into many sinewes, which solwe them selues among the partes of the vpper lippe, through the Muscle named *Massetera*, and among the Muscles of the cheeke: of whiche small sinewes also, a part enter the cavitie or hollow of the nose. An other bzaūche fleeth to the rootes of the vpper tēth, an other descendeth the neither iawe, wherof a portion in like sort is distributed to the rootes of the lower tēth. Such stoe of the as remaineth, besides these now spoken of, coast about the cōpasse of the chinne, nether leauyng the lower lippe voyde or destitute of sense.

The hole in the
middell of the
face.

The iij. payre of nerves ariseth so neare vnto the 3. that the originall of them seemeth a portion of the thyrd. But it is lesse then the thyrd, wherewith it descendeth towardes the mouth, & is cut into iij. seuerall bzaūches, which passe through the holes of the v. bone of the vpper iaw, & thence march sozwardes through the tunicle of the palate towardes the sozpartes. Besides these, other two litle bzaūches descend vnto the Processes called *Styloides*, & so to the rootes of the toung, be- yng distributed through the vpper coate therof. And the distributiō of these bzaūches to these last recited partes, are to make perfect the organ of tast. Which gift and office, though some Anathomistes not of the playner sort, haue ascribed to the thyrd payre of sinewes (which might happen through the vicinitie of the iij. with the fourth) it shalbe to me no cause of stay in this my present pilgrimage.

4.
The situation of
the fourth payre
of nerves.
Diuision.

De.

The fift payre of sinewes, rising at the same seate or ground of the bzaūne, and on y laterall part about the middell, entereth the blynd bone & laberinth sit- ted in the temporall bone, which laberinth (beyng in the history of bones playnly described) endeth at the eares. So when it is come halfe way within this labe- rinthe, becometh thicker, & doth not onely cōstitute a mēbrā. This I say is y hol- low, which we haue described more diligētly in the history of bones, wherein the iij. litle bones so meruailously seruing to the gift of hearyng, are mētioned. The one of which iij. no Anathomist as yet saue *Realdus Collubus* hath declared, nether I thinke found. To the sharpe Proesse of y litle bone which is like y similitude of y thighe, a litle nerve endeth deriued frō this v. payre asforesayd, frō which a litle w:ithē sinew issueth into this laberinth: but it goeth forth through y hole of the tēporall bone, which is placed at the rootes of the asfozenamed *Styloides*. This litle nerve is towardes y sozpart reflected, & like a serpēt entreth into y tēporal Mus- cle. In y same place an other litle nerve is found, which is it selfe w:ethed also.

5.
The situation of
the fift payre of
nerves.

The bones of
the organ of hear-
ing.

The vi. payre of sinewes is at the posterioir seate of the bzaūne, or more back- ward discerned, hauyng diuers bzaūches or rootes: and as (Galen sayth) by how much the nearer they spzyng to the Spinall marey: by so much they are also the harder. This payre descendeth through the hole that is sited betwene the bone of the hinder part of the head and the tēporall bone, in place where the inner Cleyne *Inguularis* ascendeth to the Scull. The vi. payre of sinewes is at the posterioir seate of the bzaūne, or more backward discerned, hauyng diuers bzaūches or rootes: And (as Galen sayth) by how much the nearer they spzyng to the Spinall marey, by somuch they are also the harder. This payre descendeth through the hole that is sited betwene the Bone of the hinder part of the head and the tempo- rall bone, in place where the inner Cleyne *Inguularis* ascendeth to the Scull.

6.
Galen Lib. 8. 9. 10,
vfu. part.

Col libid.
The situation of
the sixt payre of
nerves.
Distribucion.
The history of
the right recur-
rent nerve.

This vi. coniugation is diuersely distributed, for it carieth sense not onely to all the partes within the bzaūst contained, but stretcheth further, and visiteth all the bowels of Abdomen. After that the right Nerue of this vi. payre is gone out of the place aboue named, it sendeth certaine bzaūches to the Muscles of *Hioides*,

Fig. i.

and

The eight Booke of the

Arterie Carotida.

What is Glottis.

The history of the
left recurrent
nerue.

Galen Ibid.
The vse of the
Reuerſiue Ner-
ues

The vse of the
Reuerſiue Ner-
ues is to be dif-
tinguiſhed in quere
diſtinction.

Lib. 7. vii. part.
Columb. libid.
The inuention of
the recurrent
nerues.
When as tou-
ching the recu-
rent nerues
Galen could not
ſatistie him ſelfe.

The true cauſe
why the left re-
current nerue is
not reflected by
De vſu partium.

Another diſtinc-
tion.

and to ſome of the Muſcles of *Larinx*: then it descendeth betwene *Vena Ingularis*, and the Arterie *carotida*, nigh the rough Arterie, euen to the Canell bone. In the region wherof, is ſent a litle ſinew vnder the right *Axillaris Arteria* which after is reflected towardeſ the head, and cleaueth to the ſides of the rough arterie, inſinuatyng it ſelfe into the cavitie of *Larinx*, and at length in the ſmall inſtrumēt of voyce, named *γλωττις* is implated. And this is the true & brief deſcription of the right recurrent, or reuerſiue Nerue.

But agayne vnder the regiō of the Canell bone it ſendeth forth a litle bꝛanch, which runneth not onely to the pannicle *Pleura* (whiche I haue ſufficiently diſcourſed among the ſpiritual members) but likewiſe to the rootes of the ribbes: agayne ſendyng an other litle Nerue to the right ſide of the lunges: the reſt diſcendeth beyng faſtned to *Æſophagus*, downe to the vpper Orifice of the ventricle.

The left recurrent Nerue, departyng from the place where it begynneth, yeldeth litle bꝛanches vnto the ſame Muſcles that the right did, and descendeth likewiſe in the ſame ſort: and in the region of the left Canell bone ſendeth bꝛanches to the pannicle *Pleura*, to the rootes of the ribbes, and to the left ſide of the lunges: Then further diſcendeth, till it almoſt touch the greater bꝛanche of the Arterie *Aorta*: In which place it ſendeth forth a Nerue, which vnder this Arterie is reflected, and after turneth it ſelfe agayne vpwordes, towardeſ his originall and fountaine, cleauyng (as by the right is ſayd) to *Aspera arteria*: thence forth entryng in betwene the Bone that is not named, and that which repreſenteth a ſhield in the inner part of *Larinx*, and ſo entred into the organ of voyce.

Theſe are the noble Nerues, which (ſayth Galen) are endewd with the vertue of ſourmyng the ſpeech, and are beſides therfore called *Vocales nerui*. Whose offices and vſes are to much neglected, & to litle amongſt other thyngs known: for although ſew (in compariſon of the reſt) ſuppoſe in them to be contained the proper power of vocall vertue, yet (to their great admiration) if they willyngly diſſect a liuyng dogge, they ſhall proue it playne and very truth: for by diuidyng one of them you ſhall finde him maimed of his voyce, but hurt them both in that order, and he ſhalbe domme for euer after.

To this I muſt needs ſubſcribe, for often haue I of purpoſe proued it: beyng ſo playne and a part to all that behold it, as that no doubtfull queſtion can grow therof. Notwithſtandyng that, ſome will ſcarſe beleue their owne eyes. Galen was the firſt that inuented theſe reuerſiue nerues: albeit he could not ſatistie him ſelfe in the reaſon wherefore nature did not conuert the left recurrent nerue to the left *Axillaris Arteria*: when as from the left recurrent ſinewe, an other litle nerue ſpryngeth, which, follovyng the rootes of the great Arterie, is diſtributed through the coate of the hart, but pearſeth not the ſubſtaunce thereof for the litle-nes of it. And this is (ſayth *Columbus*) the true cauſe why nature reflected the left reuerſiue nerue vnder the great Arterie, and not vnder the Arterie of the arme: hole on that ſide, as the right reuerſiue nerue is ſayd to haue done on the other ſide. Whereat (I ſayd) Galen ſtoode much amased, neither could ſufficiently ſatistie him ſelfe in the reaſon therof, as appeareth in his vij. booke *De vſu partium*. But by this it ſometh that nature, as well as to create theſe notable partes, had care to place them from all eaſie annoyances: as appeareth by this nerue lately recited, which is otherwiſe reflected then the right recurrent, leaſt it, beyng ſo very ſmall, in the moynges of the hart ſo continually, ſhould happen in the tyme of breathyng to be broken.

What poztion that remaineth of this recurrent nerue, descendeth along *Æſophagus* downe to the vpper Orifice of the Ventricle. But aſſone as the right recurrent nerue, and the left, are come to the ſame vpper Orifice of the Ventricle, they are ſtraight way deuided into many litle Nerues, like nettes, and thus do imbrace

embrace the upper Orifice aforesayd. Which are the cause in griefes & paynes of the mouth of the ventricle, that the hart it selfe is thought to ake. And this disease is called *Cardiacus dolor*.

Then agayne the right from this part departyng, stretcheth forth to the Membran that inuolueth the liuer, and an other part also to the vesselle of choler, another to the left kidney, and to the upper part of *Omentum*. Besides all the branches that it committes to *Mesenterium*.

After the same maner the left recurrent nerue is branched to the splene, to the nether part of *Omentum*, to the left reyne, and to the bladder. And in men thus end the recurrent nerues. But in women, after all these places, they passe further vnto the wombe or matrice.

Now to describe the viij. payre or coniugation of sinewes, whose rising is more toward the hinder part of the head: but from the braine, not from *Cerebellum* as Galen would with many small rootes, whereto is dedicated a proper hole sited after an oblique maner in the aforesayd part or *Occiput*: through which as soon as this hath made egress, it sheweth it selfe first towarde the Anterior part, and into many Nerves, delated to the Muscles of the toung, *Hioides* and *Larynx*, is divided: Of which the greater runneth vnder the nether iawre, and so vnder the toung to the extreme end thereof, to make it partaker of sense and mouyng vniuersally. But the fourth payre as we haue sayd before, is it that bringes the sense of tastyng to the toung: and the toung therfore is sayd amongst other gistes to haue the discretion of tastyng.

These viij. payre or coniugation of Nerves, are all that are remembred either of the auncient, or later Anathomistes, as touchyng the sinewes coniugated fro the braine: yet *Vesalius* seemed to smell an other (sayth *Collumbus*) but whether it were so: that he would not go asse from auncient authorities, or otherwise, it is not knowne: he concluded at length that it was in his iudgement, the roote of the fifth coniugation. But *Collumbus* doubteth not, that vnder the seate or foundation of the braine towardes the fore partes, goeth an viij. payre, which through a proper hole in the bone *Sphenoides* passeth to the temporall Muscles, to the Muscle lurking in the mouth, called therfore of Galen *Latitans*, and to the thyrd Muscle also of the nether iawre called *Masseteres*: the originall of this beyng distant fro the fifth payre of sinewes sufficient inough.

Besides all which we haue hitherto yet sayd, in declaring the originall and distribution of the viij. payre of sinewes proceeding from the braine: and besides also the viij. and last spoken of, you shall heare the opinion of *Realdus*: who by his often search and diligence, doubteth not to proue a ix. payre or coniugation of nerves, which no man before his tyme euer wrote or inuented. And this is (sayth he) a slender payre, beginning at those two foldes, or two together Processe of the braine called *Nates*; *Penes*, *Testes*. These beyng thicke and small, walke towardes the face, and passe also to the second payre, and are scattered into the thyrd Muscle of the eye liddes, fitly also branching out to the fifth Muscle of the eye.

In dooe as he doubteth lest some, or most will not admit his late inuention of these two last payre of Nerves, but, holdyng them selues more stedfast to the same of authorities, will rather accompt them as the rootes of others: so he professeth not to contende therein, neither will we pretermitt any tyme in discussing the matter. For we thinketh it sufficeth vs to knowe the branching of the Nerves, as also perfectly from whence they procede: which may be well inough, without so many sundry diuisions, namyng (except it please the gentle Reader) neither viij. nor nine payre: onely be diligent to finde out how Nature hath made their distribution.

Galen, in his ix. booke *De vñ partium* fully affirmeth that the harder sort of

Why the mouth of the ventricle payned the hart seemeth to ake.

Another distribution.

The situation of the viij. payre of Nerves. From the braine not from *Cerebellum* springeth the 7. coniugation of Nerves.

Col. Ibid. Vesalius excuseth.

The description of the viij. payre of Nerves of the braine.

The description of the ninth payre of sinewes of the braine.

seen in error.

The eight Booke of the

sinewes are onely made and ordained for the cause of moving, but other wise vnapt for sense: agayne the soft sinewes, in like sorte, to minister sense to the singular partes of the vniuersall body, beyng not so able for moving as the rest. Wherfore the harder sort of nerves, haue their originall from their Spinnall marey, but the hardest of all from the lower partes thereof: the soft then agayne are brought from the braine, but of those likewise, the nearer to the Spinnall marey, so much also more harder then the other. So that by this reckenyng, Galen accompteth this of the sinewes, that the softest are the perfect sensible, the more hard the further from perfection of sense, but the hardest of all, to be not farthest of onely, but (sayth he) altogether vnapt for sense. For which *Realdus Columbus*, no other wise then reuerently reprooueth him, assuryng vs, that there be no nerves in the body (the visible onely excepted) but carieth with him both sense with moving, and moving with sense. But now, since we haue laboured sufficiently to prosecute the order of the by payre of sinewes, we will presently resorte to the nerves of the Spinnall marey, called also *Cerebrum elongatum*.

Columbus Ibid.
All the Nerves
(except & optike)
carry sense & mo-
uynge.

Of the nerves of
the Spinnall ma-
rey.

Columb. Lib. 8.
Cap. 4.
Fuch. Lib. 6. cap.
The innouelures
of the Spinnall
marey.

As the marey of the Spine or ridge of the backe is esteemed by the consent of all Anatomistes, to be of the like substance, that the braine is, whose originall also is the braine, stretched forth long wise through the turnyng ioyntes to *Os sacrum*: So is it no lesse strongly munited and armed with defensive propugnacles called the Vertebres, or turnyng ioyntes, then the braine by the inclosure of the Scull, or bones of the head, as I haue sayd before, euen aboundantly in the history of Bones. And this is to be noted of the Spinnall marey, that as the braine, so this marey thence produced, is couered with the like two Membranes, as *Pia mater*, and *Dura Mater*, or *Crassa Membr.* which enwrappe the same, and to the outmost end of this elongated body. Wherof the one next the substance, and the other on the outer side of that agayne, to defend the same from the ruinous actions of the Vertebres.

The difference of
the Spinnall ma-
rey from the ma-
rey in other
bones.

The difference be-
tweene the braine
and Spinnall ma-
rey.

The beginning
of the Spinnall is
double.

The greater be-
gynnyng of the
Spinnall marey.

The beginning
of the Spinnall
marey whence.
The course of
some.

This although it is called marey, yet thereby we vnderstand not such marey, as is the cavities of other bones, for neither is this so fat or flowyng, neither is the other couered with the Membranes of the braine, as is the Spinnall marey, neither is there with it any communion with the instrumentes of sense, or Muscles. Agayne, the Spinnall marey differeth from the braine in two thynges. For first, the braine hath *Diastole*, and *Sistole* like the hart, (as before we haue sayd) but so hath not the Spinnall marey. Secondly this marey is carryed through Bones which are moued, but steadfast and stable are the Bones of the Scull, compassing about the braine.

The beginning of the Spinnall marey is double, or two fold, the one more, and the other lesse: the more part springeth from the braine, but the lesse from *Cerebellum*. And agayne, that that is brought from the braine, is onely one manner of way or fourme, but from *Cerebellum*, two fold, or deuided into the left, and right part. But the greater beginning of it proceedeth in such sort from the foundation of the braine, as it seemeth to be the very ground thereof.

Wherfore to speake apertly, it springeth from the fore part of the braine: from thence therfore is to be taken the beginning thereof (as sayth *Columbus*;) then not in the place where it first entreteth into the Vertebres, as it please some, in which place it is endewed with no circumscription. And if then the beginning thereof be in so high a place to be appointed, are we not forced to graunt the third, fourth, fifth, sixth, seventh, and eight payre of sinewes not to spring from the braine, but from the Spinnall marey.

Where the Spi-
nall marey is
thicker.

This marey entryng forth of the hole of *Occiput*, into the first of the turnyng ioyntes, is somewhat more thicke then in the whole progresse that it maketh betwix. But agayne at such tyme as it commeth to the top of the breast, it is thence
to

to the toppe of *Os sacrum*, of equall thicknes. Although some, not of the nearest, supposed it in the meane space to waste by the getting of nerves, whē as in deede in *Os sacrum* onely it becommeth more slender.

In goyng forth of the Scull it is clothed with *Pia*, and *Dura mater*, therfore it clotheth also those Nerves that stretch forth from it. But when it must passe through the movable Bones, nature added thereto an other thinne Membran, least the same marey should any way be hurt by the hardnes of the Bones. In which Membran Galen is thought to be deceived, for because he esteemed this third tunicle to be a Ligament, wherewith the Vertebres should be connected and knit together. Which to be true, thincke how: since the turning ioyntes besides are not destitute of the proper Ligamentes, as in the History of Ligamentes appeareth. For no man can surmise, or iudge this thinn tunicle to be fit or apte in colligatyng and byndyng together these bones, whose motions are so great.

The Spinall marey therfore is founde marey like, or medullous onely to the extreme part of the brest, but then in marchyng thence forwarde, it appeareth sinewy: like whereto are the sinewes thence procedyng. But this esteeme to be by meanes of the diuision therof. Wherehence it is easie to be discerned, why some matter descendyng through the Spinall marey, the greater hurt is felt in the inferior part. The cause is very apparaunt: for that in this place it is sinewy, but in the other medullous, or rather a portion of the brayne elongated, as we haue sayd before. For els it may seme, that we vse this word medullous improperly: since that is onely marey, which nourisheth the Bones. To which in nothing this is like: neither yet is the Spinall marey (though Galen him selfe would haue it so) softer, then that, wherewith the bones are nourished.

And had not the almighty creator thus produced it of two thynges, the one had come to passe. For either all the partes of the body vnder the head, and besides the Nerves of the vi. payre and admittyng no branches of the sinewes of the brayne, should haue bene destitute of the arbitrarious mouyng, and frustrated of sense, whereby now so exquisitely they haue the knowledge of every annoyance: or els of necessitie to euery part of the body a nerve from the brayne must haue bene deriued. But if they had wanted mouyng, then no more had man answered the fourme of a liuyng creature, but a picture rather of stone, or clay: and on the other side, from the brayne to reach both small & great nerves to euery part, had bene the part of a workman, little wayeng the securitie of the nerves.

Therfore the Spinall marey was provided, that there hence Nerves might spring to fulfill all other partes of the body with sence, and mouyng: which are otherwise destitute, for any of the vi. payre of the brayne, that visiteth them. When that this marey should be of affinitie with the brayne, which provideth so noble partes to the body, who can doubt, gayne say, or inueigh to the contrary, vnlesse he beate armour agaynst truth.

It is described by Anathomistes diuersly, as touchyng the partes of sinewes traduced from the Spinall marey: but because we will consume no tyme to aduise, and reply vpon euery selfe opinion, for saymyng ouer correctiue, as some are ready to object, we will fall to the onely distribution of Nerves. What is, when they provide, and how they are after solone abroad among the partes of the body.

The first payre therfore of these Nerves is sent forth betwene the bone of the hinder part of the head, and the first Vertebre of the necke, so priuely, and artificially, as that the motions of the head are all together denyed to iniurie them. And to the end this might safely be brought to passe, nature hath engrauen a proper cauitie, as well in the bone of the hinder part of the head, as also in that side of the first Vertebre, or turning ioynt of the necke, which ought to end at a spine,

Eg. iij.

The sinuolure of the spinal marey.

Galen Lib. de Offibus.

The Spinall marey in marchyng forward becommeth sinewy.

Why hurt in the inferior part of the Spinall marey is greater.

Cal. in errors.

The necessitie of the Spinall marey.

The vse of the Spinall marey.

Columb. Ibid.

The first payre of nerves from the Spinall marey.

or

The eight Booke of the

32 point. This coniugation of nerues thus departing, are afterwarde disparted into diuers and sundry litle branches, both by reason that the payre it selfe is but small, as also moze commodiously to be distributed vnto the notable company of smal Muscles that serue to the head. For they arose the first Vertebre, and were caried to the hinder part of the head, and agayne, from thence reduced to the second Vertebre. But before it go forth, is reflected about the Spinnall marey: a thyng notable to behold.

The second payre, or coniugation of sinewes, because of the impossibilitie of commynge forth at the sides of the Vertebres, as appeareth, hath two beginnings: whereof the greater appearing backwardes, is caried here and there by the sides of the Spine of the second turning ioynt, whether once being come, it deuiderh it selfe into very many partes & branches, which reflected presently vpiwardes, stretch forth to the skinne of the head, to the eares, and to Muscles there aboutes. The other begynnynge lesse then this, commeth forth by the forepartes, betwene the first and second Vertebre, by the sides of the tooth therof, (as appeareth by the description of the second Vertebre, in the history of Bones) and is distributed to the first Muscle of *Larinx*, which is common to *Esophagus*.

The third payre of sinewes engendred of the Spinnall marey, crepeth through the common hole of the second and third Vertebre, & from their sides as you haue heard by the rest. When after hath a former diuision, which is into foure partes or branches, but those not so contented are into very many partes, some to the Muscles of the head, & to that long quadrangular Muscle brought from the fleshy *Spē* *hyan*, which obliquely draweth the lippe downward, some to that long Muscle that pulleth the shoulder blade vpiward, & others to the skinne of the necke, ramified.

The fourth payre passeth forth betwene the iij. and fourth Vertebre, through the common hole to them both. Which in like sort is to be vnderstanded by all the other that follow: therfore remembre it, for the crature of the nerues through the hole common to two Vertebres, I will repeate no moze hereafter. This payre thus passing forth (as I say,) is into diuers branches deuided, whereof some ascende, some descende, and others haue them selues to the hinder part. Further moze from this payre are sent small sinewes seruing to the Muscles of the necke, as also to the Muscle called *Cucullaris*. But among the fore partes or branches, some are inserted to the Muscles strewed vnder the stomache, one of the which, being a small one, is vnited with a branch of the first payre, and the first with the first: of the which three beginnings are constitute those Nerues, which march forthwardes downe to the *Septum transversum*, descendyng by *Mediafina*, and about *Pericardium*.

The goynge forth of the first payre is found betwene the fourth and fifth Vertebre, deuided thence into many Nerues, both anterior and posterior. The anterior branches, which is most of the others apparant, is vnited with a branch of the fourth payre, and in some, taketh a litle branch from the others that follow. This nerue, thus made and constructed of three, descendeth to the sides of *Esophagus* by the fore partes of the turning ioyntes of the necke, and so downe to the fleshy partes of *Septum transversum*: In which part the end thereof is determined. *Columbus* sayth that in some this riseth from the fourth payre: but that seldom, for it is most often founde to procede from the first.

But note when first this commeth to the hollow of the brest; least the continual mouing of the lunges should be a meane to hurt or breake the same, it is bounde or stayed with certaine Membrans, both aboue and beneath *Pericardium*. This nerue with a veyne is properly associated.

And no maruell (getle Reader) that nature so willingly prouided for the safe conduct of this Nerue, since to the midreife it was destinated: a Muscle so rare and

5.
Division and
distribution.

Col. Ibid.

The midreife a
noble muscle.

and noble, as in all mā's body is none the like. That which remaineth of this fifth payre of coniugation is diuersly disparled: for a braunche thereof accompanied with a Veyne and Arterie, is sent through the middest of the hole that is sited in the shoulder blade, and there spent amongst the Muscles that from the same scaple bone do spring.

An other braunche descendeth through the sides of the necke, and is distributed to the Muscles called *capiti & Cucculares*. Other braunches stretch to the shoulder, others to the foure square Muscle that draweth the lippes obliquely downewardes, as also to the iij. Muscle of the bone *Hyoides*. Sondry others to the cavitie of the shoulder blade, where there are entwined to the Muscle there luyng, and to the second Muscle of the brest, as also to the skynne there aboutes.

Vesalius numbzeth this fifth coniugation amongst the *Perues* of the arme, because it is spread forth vnto the Muscles seruing the shoulder. But *Columbus*, because it goeth not together with the v. nerues of the hād, will in no wise so accōpt it. Of the which *Perues* of the hād, because of the true Anatomistes it is much wished, we will now addresse vs towardes it, that truth the gemme set in order, the soyle may shew more persite.

The hand, beyng (as sayth Aristotle) the organ of organs, and an organ before all other organs, to the end it might excell in the sharpe sence of touching, nature hath chosen, and geuen thereto five proper and needfull payre of sinewes, that is to say, thre to the extreme fingers, and two to the extreme hād. All which five payre haue their originall from the Spinnall marey, goyng forth by the common holes of the Vertebres of the necke, and the first turnyng ioynt of the brest. And these after they be gone forth from their risings, as is sayd, are so vnited afterwarde together, that one payre from an other it is almost impossible to distinguish. Neuerthelesse they are at length separated, seamyng to constitute and frame them selues after the fashion of a net.

These five payres of sinewes march forth with one consent vnder the chanell bone, as also to the inner Proesse of the shoulder blade. In the which place also they are accompanied with *Vena Basilica*, & *Axillaris Arteria*: wherefore no marueile though a wound in this place be fearefull and dangerous. But to go to euery one of them seperately.

The first payre of *Perues* to the handes is brought forth betwene the fift, and the sixt Vertebre, when it is come to the cavitie vnder the armerhole, it sendeth forth a nerue to the first Muscle of the brest, and to the second of the scaple bone, and a braunche in like order to the first and second Muscle of cubite, whereby the same is bolued. Furthermoze, if you willingly follow it further, it runneth vnder the first two headed Muscles through the inner part of the shoulder, but after the bought of the cubite, it accompanieth with the common Veyne, and both together as it were with one tract, are deduced to the extreme part of the hād. But in that space not ceasing to poure forth sundry litle braunches to diuers partes of the skynne there aboutes.

The going out of the second payre is according to the same iourney & place that we haue described to the first, so then it sendeth thre *Perues* to the Muscles that serue the shoulder, wherof one issueth out at that hole of the shoulder blade that luyketh vnder the armerhole, beyng first diuersly distributed, the after is caried straight forth after the fore part of the shoulder to the bought of the arme, passing there betwixt the bone *Cubitus* & *Radius*: but note that at what tyme it entred into the bought, it disperseth it selfe in braunches, which are bestowed on the 4. 5. & 6. Muscle, by whose meanes all the five fingers are bolued. But so soone as it is passed & gone behynd the middest of the bone *Radius*, it putteth forth a nerue sufficient apparant and deepe, which cleauyng as it goeth to the Ligament that is set betwene

Fig. iiii.

the

Vesal. Lib. 4. cap. 14.
The opinion of
Columbus.

Why the nerues
of the hand are
particularly described.

The hand is the
organ of organs.

Five payre of
nerues to the
hand.
The beginning of
the five payre of
nerues to the
hand.
Where they are
vnited.
Where they are
seperated.

Why woundes
to the inner pro-
esse of the scaple
bone are deadly.

1.
Of the first payre
of nerues of the
hand.

2.
Of the second
payre.

The eight Booke of the

Col. Lib. 8. cap. 3.

In the ball of the
hand sometime v.
sometime vij.
Nerves.

Of the third payre.

Why the palme
of the hand is so
sensible.

Of the fourth
payre of nerves
to the hand.

the Bones *Cubitus* and *Radius*, is at length implanted to the quadrated or foure squared Muscle in the histoy of Muscles manifest: which being sited neare vnto the wrist, moueth the hand directly downewardes in prone maner. The greater trunk of this same nerue descending further, and lower, creepeth vnder the Ligament that lyeth on the inside of the wrist, in which place it bringeth forth sundry bzaunches duely dedicated to the Muscles of the thombe, and others to a portion of these Muscles, which we haue called long Muscles, and shewed to spring from the Tendons of the first Muscle. Other bzaunches likewise it sendeth to those Muscles which, rising from the postbrachiall part of the hand, do bowe the first ioyntes of the fingers. Which done, in the palme of the hand it is cut into v. partes, but some tyme into seuen, though not so often. Of which five partes, two marcheth forwardes through the sides of the thombe, to the extremitie thereof, in the meane tyme here and there distributyng their surcles to the skinne: two other posse themselves to the extreme partes of the forefinger, in the meane tyme neither laying wast the skinne & compasse about them. The first runneth through the inside of the middle finger. And these are the five partes: but in such as it is deuided into vij. partes, note the vij. iourneyeth through the extreme region of the middle finger, and the vij. through the inside of the litle finger. And thus much of the second payre of sinewes seruyng to the hand.

The thyrde payre so addicted, after the selfe same maner runneth downe after the side of the shoulder, and inferiour partes of the cubite, as also about the ioynt betwene Olecranon, and the inner Tubercle of the shoulder, where it bringeth forth diuers bzaunches, which through the first Muscle, of which is made a large Tendon, may easely be found scattered, as also to the second and thyrde Muscle of the wrist. Then it marcheth after the length of the cubite on the inside, about the middest wherof, or litle more it is deuided into two partes: the one greater, and the other lesser, & the one agayne taketh his race more deepe, the other more outward. That which runneth inward, passeth vnder the inner Ligament of the wrist, there ramifying to that first Muscle with a broad Tendon, which *Collumbus* first obserued, & from thence to the vij. Muscle whiche leadeth the litle finger from the rest: not ceasing to yeld the like kindnes to those Muscles that extēd or stretch forth the fingers, which (in the proper place) we haue sayd to spring from the tendons of the first Muscle that boweth the thyrde ioynt of the fingers: neither denyng to assist the Muscles that bowe the forme most ioyntes, and which cleaue to the postbrachiall bones: this done it seuereth it selfe into thre, and sometyne into v. which stay their courses at the extremities of the fingers, being through the sides of the ring finger and litle finger delated, although sometyne it is founde to stay about the middest of the middle finger. Beyond all this it imparteth slender bzaunchings liberally to the skinne all about, & namely to the palme of the hand, which maketh it become so sharply sensible, and exquisite in touchyng. But now to come to the lesser bowe or bzaunch before deuided. This, straying through the exterior partes of the hand, is reflected aboue the wrist, there into thre proper rames specially deuided. But in some preparyng five casteth them through the upper of the backe of the hand. So through the sides of the litle finger & ring fingers, and through the halfe of the aforesayd middle finger, and to their extremities committed in like order as is declared by the other on the inside: Duely in this differyng, that the inner are much greater, then the outer Nerves, most nobly done of Nature, who was not ignorant that the outer might with more facility be hurt then the inner.

The fourth coniugation of Nerves prepared for the handes, is greater then all the Nerves thereto distributed, and taketh in hand the like rising and iourney as doth the rest, but when it is come very neare to the middest of the shoulder, it

is reflected to the exterior and superiour partes thereof, whence and in what place issue forth little Nerves to the Muscles that bowe the cubite, and further to the exterior Muscles, not neglecting the scope of the skinne to the cubite and Shoulder appertaining. Among diuers other Muscles there aboutes, this fourth nerue lurketh, wherfore branching along by the Bones *Radius* and *Ulna*; after that by such meanes the Muscles that rise from the middle of the cubite to serue the thombe, are refreshed, it visiteth forthwith the wrist, whereas like vines in trunke or stocke deuided into fine partes, so in like order this is feneced: y. wherof bysypng into y forefinger, other two delite the thombe, the fist is sent to stiffen the extreme part of the middle finger, as is sayd of others before. But from those whiche we sayd to go forward to the thombe, are crilled very small furtules, or twiggges; whiche yeld that benefite they may to the Muscle that is placed betwene the Thombe and forefinger. And truly great is the distribution of this fourth nerue beside among the Muscles of the cubite.

But the fist nerue is very small, of whose branches some are made out to yeld sense vnto the skinne of the Shoulder and cubite: other branches it sendeth in like sorte vnder the armetit: what remaineth associateth *Baslica Vena*, and in the same iourney dispareth diuersely kireles through the skinne, and at length endeth at the extreime partes of the hand. Howeuer fro this fist nerue certaine are sent vnder y Cannell bone, to the viij. Muscle of the head, so to the first, and fourth of the bone *Hyaloides*; to the first, and second of the breast, and to the vi. of the Shoulder; as also to those Muscles, that serue to draw the necke sidewayes. And this is the place whence small nerves are conuinduced to the fleshy *Pernian*, and so to the skinne of the necke. In this sort consider of the distribution of nerues vnto the hands, with as much perspicuitie as by huiltie described. But note that in all persons you shall not finde the small surcles and twiggles of nerves alike disperfed, yet the bodys, stockes, and bowes of them you shall see in sundry bodies smally disagreeing. But this is not to be maruelled at, if you espy in some bodies a Nerue that runneth through the middell of a Muscle, and the same in an other to goe through the sides of the same. And so because in some that are wounded, some tyme feeling is lost, and yet the maner of mouyng remaineth still, and in others contrarily, as the mouyng lost, sense leaseth not; in others so both are destroyed together: Some Anatomistes (I say) in this case seemyng astounded, and desiring to finde the cause, haue made differences in Nerves, that is to say, they will haue it that in every place where Nerves are distributed in the body, there should be both Nerves sensitive, and motie. But this opinion *Realdus Columbus* supposeth none to be of, saue such onely as are ignorant of the true distribution of nerves. And therfore that it is sufficient to say, that those surcles of sinewes that disperse abroad in the skinne, do byyng sense, (since the skinne moueth not) and such as are addited to the Muscles, impart to them both feeling and mouyng. Wherefore when the Nerves of the skinne are wounded, or that noyfull matter segregated to those partes doth corrode or destroy them, it is no rare matter if the skinne in such places be left destitute of feeling: as also mouyng is marred, when in place of the Muscles where they are resident, solution of continuitie is made, with breache of the concurrence of the Nerves: And both are then maymed, when not onely in the Muscles, but also in y skinne, the sinewes be disperfed or deuided. Judge therefore in this wise the causes, when either sense or mouyng perisheth, as also when both be destroyed together. Or if I shall speake playnly, a hurt that chaunceth vnto the Nerue before it enter into the Muscle, and in place where it should Retrahere, and Contrahere, cannot be any meanes conioyne, or knitte together agayne. But if the like happen in that part whiche is already

5.
Of the fist paires
of nerues to the
hand.

As the nerues
of the hand
are distributed
to the fingers
and thumb.

Not in wounded
persons sometime
sense sometime
mouyng. Some-
time both is lost.

Not by the hurt-
ing of a Nerue
feeling or mo-
uyng may be lost,
when neither.

The eight Booke of the

entred the Muscle, in that parte shall neither continue amission of sense, nor moving.

If the fancie of any reasonable man, that laboureth with no lesse industrie to seeke the truth, shall perswade him to adde a sixth paye of Nerves to the handes, as heretofore it seemed good to *Vesalius*, let him beware; least in his indgement he deceiue him selfe, taking the deuision of some stocke; for the originall of some Nerve: in whiche absurditie many are weltned, whose names on earth resounde as ecchoes from the rockes, beyng in nothyng so farre deceived as in the partes of mans body.

Vesalius cap. 15. Lib. 4.

Galen erreth in nothyng so much as in the partes of mans body.

Of the Nerves produced fro the Vertebres of the brest.

The Nerves of the brest are xi. paye.

Vesalius in error.

Division and distribution of the Nerves of the brest in generall.

The Nerves of the brest, whiche are lesse then they of the hand, also haue their originall from the Spinall marey, forth of the twelue Vertebres of the brest: howbeit they are not twelue paye, what soeuer moued *Vesalius* so to say, who not to haue espyed that to xi. Vertebres appertaine xi. holes, like as to xi. ribbes, xi. spaces, it is marueilous.

These twelue therfore of the brest, which issue forth at the common holes of the Vertebres of the brest, do not immediately constitute the fourme and manner of a net, as do the Nerves of the hand, but after their goyng forth, they all seuerally deuide them selues into two vnequall portions: for the payes, in their distribution, some reach forth greater on the one side, the on then other, and some to the fore partes whereas their mates to the hinder partes are reflected.

Those that delite the fore partes, marche after the inferiour partes of the ribbes, after the cauitie in the lower part long wise engrauen: whiche in the History of Bones and description of the ribbes is more playnly set out, beyng couersant eche one in course, with a braunche of the veyne that is sayd to haue no mate, and of the great arterie. All which thre (I meane the nerue, veyne, and Arterie,) passing by one way, euen from the aforesayd Vertebres to *Osterion* after the length of the ribbes, and the Cartilages, under the succingent Membran, or *Pleura*, like lynes equally and proportionably distaunced, do enter among the Muscles intercostales, amongst whiche, both the outward and inward, they are ramified and spread.

Others are thought to byng sense to the sixth Muscle of the brest, beyng placed in the inside of it, and do bynde together the forepartes thereof. From the foresayd, Nerves flow through the first Muscle of the shoulder, and through the second of the shoulder blade. Furthermore other braunches are caried to the pappes, and their nipples or teates, brought from these nerves whiche in order follow: then more downward, from the nerves that are placed in the middle region of the brest, surcles are deriued, which are charged with the oblique descendend Muscles of Abdomen, in which place, of these nerves a large distribution is made. But from the last nerves of the brest are others departed, in which the fleshy part of the famous Muscle *Diaphragma* is delited. The remnaunt of the Anterior sinewes are commaunded both to the skinne of the brest and bellye, sendyng also nerves among the Muscles, layed vnder *Esophagus*: as also to the rootes of the ribbes. Note further that with these nerves, the vii. coniugation of brayne is interlaced and mingled.

The other diuision of the nerves of the brest is reflected towarde the hinder partes: and nerves from the aforesayd begotten, do carie sense to the first and second Muscles of the head, and to them of the necke: so in like sort to the fifth and sixth Muscle which circumuerte or turne about the shoulder, some makyng speede to the first and fourth of the shoulder blade: diuers direct them selues to the thyrde of the brest, and to the skinne about the shoulder blade, many visite the Muscles of the backe, makyng no lesse way to the fourth of the brest, and to the skinne of the backe beyng distributed.

But

But of this I would haue every one that readeth the History of nerves to consider, that this Fibre like bzaunchyng of sinewes among the skinne partes, is in no wise to be accounted like in every person: for so they be not in deede, neither is any Anathomist able to decide perfectly in one speciall description, the crafty crēpyng courses of the small twistes, or cutaneous surcles, to serue for all bodyes: For as much as they can neither inuent the right order, nor certayne number, but in some moe, in other some fewer, now also higher, and now moze crooked. Thus seuerally iourneyng, and diuers is their distribution.

The paynfull Anathomist shall finde, that in cōparison of the sinewes appertaining to the brest, these of the loynes are much greater. And although among fine Vertebres of the loynes, there is but foure common holes, yet fine sinewes are from them deriued, that is, as we haue sayd fine, payze or coniugations: For because the first payze goeth forth betwene the extreme Vertebre of the brest, and the first of the loynes, giuyng backe from the last ribbe, and is therfore rather nombred among the sinewes of the loynes, then of the brest. And that the moze willingly since it denyeth his seruice to the brest, to yeld the same to the lower belly.

Wherefore now to speake briefly of this first coniugation addicted to the loynes, it crēpeth forth at the common hole engrauen betwene the twelfth Vertebre of the brest, & first of the loynes, whiche beyng of it selfe sufficient small, marcheth sozwardes vnder *Peritoneum*. After the egress or goyng out thereof, it cleaueth into two bzaunches, whereof the one is greater, and the other lesser: the greater of them is caried to the fore partes, first preparyng nerves to the begynnyng of *Septum transversum*, whiche we haue sayd to arise from the bodyes of the Vertebres of the loynes: Other soztes it sealeth not to profer to the endes of the fift Muscle of the thighe, called by his proper name *Lumbalis*, and many others to the Muscles of Abdomen. But the lesser nerue of this first coniugation, reflected towardes the hinder partes, endeth among the Muscles of the backe.

The second coniugation goeth forth betwene the first and second Vertebre of the loynes, marchyng vnder *Peritoneum*, and vnder the fift Muscle of the thighe, in whiche Muscle many bzaunches also from this coniugation are spent. But rising vp at length, notwithstanding vnder *Peritoneum*, dispatcheth a bzaunche from the toppe of *Ilium*, whiche leapyng out of Abdomen, profereth both sence and mouyng to the first Muscles of the thighe, and to the first of the legge. But an other bzaunche it commaundeth to the first of the thighe; and first of the legge, and mountyng aboue the vpper part of *Os Ilium*, to the skinne of the thighe. Besides all this, a very small sinew springeth from this same second payze, whiche beyng likewise very long, doth associate the seminarie vessels, and endeth at last in the Testicle. Whiche Nerue, some beyng greatly deceived, do call *Cremasteres*, for neither is this Nerue, nor the seminarie vessels to be called *Cremasteres*, but onely the fleshy Fibres placed in the coate of the Testicle called *Dartos*.

The thyrde payze of Nerves from the loynes goyng forth betwene the second and thyrde Vertebre, is caried vnder *Peritoneum*, and vnder the fift Muscle of the thighe. The first bzaunche from this payze decided, runneth vnder *Os pubis*, neare vnto *Os Ilium*: where it is into two deuided, the one part through the vpper partes brought to the skinne of the kne, the other followeth the beyne *Saphena*. And what portion thereof remaineth, is committed to the Muscles, and skinne clothynge the backe.

The fourth of these coniugations appeareth betwene the thyrde and fourth Vertebre, and beyng the greatest of all the nerves produced from the loynes, is

Wh.ij.

caried

The cutaneous distribution of nerves is not alike in all partes

Of the nerves produced fro the Vertebres of the loynes. Why there are b. payzes of nerves of the loynes and but iij. holes

1. Of the first payze of nerves of the loynes.

2. Of the second payze of nerves of the loynes.

The error of some. What is Cremasteres.

3. The thyrde payze of nerves of the loynes.

4. Of the fourth payze of nerves of the loynes.

The eight Booke of the

carried vnder the fift Muscle of the thigh and *Os pubis*, and fellowly accompanieth a Veine & Arterie into the flanke: In which place it begetteth a sort of small surcles, which to the skinne and cutaneous partes of *Penis* and *Scrotum*, are right seruiseable, but no deeper do they runne. Afterwardes in this region of the flanke it is deuided into seuen bzaunches, whiche are distributed to all the Anterior Muscles which shew their seruice partly to the legge, and partly to the thigh: Of which bzaunches, some likewise descend vnto the knee.

Of the fift coniugation of the loynes.

The rising of the fift coniugation is in like sorte betwene the fourth and fift turnyng ioynt, which like vnto the rest is into two partes deuided: wherof the greater hath his passage vnder *Peritonaeum*, towarde the fore partes, though the hole betwene *Os Coxendicis*, *Pubis*, and *Ilij*, whence after nerues are professed to the ninth and tenth Muscles of the thigh, that turne it in compassed sort: Others thence straight to the seuenth & eight Muscle of the same thighe, to the Muscles of *Penis*, and to the bladder, and in women not onely to the bleedar, but also to the matrice: notwithstanding the sinewes that resorte thereto from the vii. coniugation of the bzaune. And thus much of the first part of the fift payre of the loynes. But the second part is reflected after the Muscles about the backe, and to the skinne, as is sayd by the iiii. coniugation. And is this the brief description of those fine payre of Nerves that appertaine to the loynes, whiche in goyng forth are connected and knitte together, the first with the second, the second with the third, the third with the fourth, & the fourth with the fift, in order comparable to the implications of the sinewes of the arme.

Howe these payres of nerves of the loynes are connected and knit together.

Realdus Collubus lib. 8. cap. 7. The Nerves of the loynes are not alway fine payres.

And although the whole packe of the principall Anatomistes haue thus affirmed fine payre of sinewes to the loynes, yet *Realdus Collumbus* confesseth that not alwayes fine payre are founde, but sometymes foure: for that in some persons (sayth he) the fourth with the fift hath such communitie, that of them both but one payre can be described. Wherefore it anapleth not to meruaile why the grounded opinions of such famous men as haue sustayned great labour and traueil in the pilgrimage of mans body, should in tract of tyme sounde so dissonant, since neither countrey, age, nor nature haue consented, that in the bodies of creatures should be no dissention. But now to come to the coniugations produced from *Os sacrum*, whiche may be called, and that worthely, the sinewes of the faxe.

Of the nerves of Os sacrum, & foote

Their beginning

The Nerve the greatest of all in the body.

These sinewes therefore are founde to issue forth betwene the last Vertebres of the loynes, and the toppe of *Os sacrum*, and from the first, second, and third hole of *Os sacrum*. They are foure in number, which from their beginning once gone, are so coniointed and knit together, as worthely they may constitute the greatest nerve in the body, which, beyng esteemed no lesse, runneth in progresse vnder *Peritonaeum* from the inner part of Abdomen, to the outer, towarde the haunches, and betwixt *Coxendix*, and *Coxix*, aboue that fourth Muscle that turneth about the thighe. After where it iourneyeth neare the greater Procelle trochanter, it sendeth forth nerues then, to the three Muscles springyng from *Coxendix*, and that serue to bolue the legge. Others also to the blacke or leady coulored Muscle, growyng after the same sort from the greater trochanter: but here it ceaseth not, since afterward it casteth about through the hinder partes of the thighe, betwene the fourth and fift Muscle of the legge, almost to the bought of the knee. In whiche place it is after deuided into two notable bzaunches or bolues, one somewhat greater then an other: wherof as the greater is excellently occupied among the hinder partes, so the lesser with as great celeritie, spredeth him towarde the forepart of the legge.

The greater agayne with sundry surcles from his body deriued, visiteth the bought of the knee, and the first Muscles to the outside of the foote appertainyng. But

But from the lesser it is easie to discerne one litle one deriued, whiche searcheth the body of the *Muscle* vnder the hame, and an other that assaileth the thyrd *Muscle*, whose begynnyng is at the exterior head of the thigh.

But note by the way, that the greater body of this sinew after it hath passed the bought of the knee, is presently into other partes diuersly deuised: wherof one stretcheth forth vnder the two first *Muscles* of the foote, whose fleshy partes, when it hath passed, and ouergone, it crapeeth along vnder the skinne, hastning speedely after that sort to the hunder partes of the legge, not neglectyng the extreme partes of the foote. From the other bzaunches, small surcles arise at the fourth, and greater *Muscle* of the legge, from thence to the interior and posterior partes of the legge, and keepeth his course vnder the inner ancle, so stretching vnder the sole of the foote, to augment his circuite, strayeth out to the very skinne, and to the first, second, and thyrd extreme *Muscle* of the foote, then afterwarde to all other sortes of small *Muscles*, that in the sole of the foote retaine any seruiceable offices. Moreover, besides the sundry deuisions and distributions of this bzaunche rehearsed, it is after cut into ten portions of nerues, whiche by couples, that is to say, two to every one, are commaunded to attend vpon the toes of the foote and their extremities, as also to yeld like bountie of their functions, to the skinne and cutaneous partes of the toes.

But an other bzaunche moze deeply penetrateth betwene the greater and lesser *Focile*, cleauyng to the Ligament there intersted, which Ligament is sayd to deuide the anterior from the posterior *Muscles*, and ramifieth not obscurely amongest the fift, sixt, and seuenth *Muscles* of the foote. An other lesser trunk is intertaind among the foze partes of the legge, sliding vnder the Appendaunce of the lesser *Focile*, or *Fibula*, where it profereth nerues to the *Muscles*, as well from the greater, as the lesser *Focile* crozted or sprung. The trunk descendeth still downewardes, notwithstanding by the anterior partes of *Fibula*. Wherefore in this point we are admonished that in the application of a cauterie we pze-sume not so farre as *Fibula*, but onely to the shinne or greater *Focile*, neither passe the depth of the first *Muscle*, for further, shall perishe the nerue last recited, after which ensueth most greuous accidentes, and payne in that place perpetually.

A Caution for the
applicatio of cau-
terie to the legge.

That portion of this nerue that remaineth, is caried vnder the Ligament, and foze part of the foote, pearling vnder the extreme ancle, and through the extreme partes of the foote: out of which seate certaine surcles are sent to the xij. *Muscle* of the foote. Then after what remaineth, is separated into x. litle nerues, all which are notably inserted, and surely settled to the extremities of the toes. Yet this is not all: for from the same trunk, one other small sinew is extended, least the extreme skinne partes of the foote, boyde of their company, should be frustrated of sensible propriety. After the iij. holes in *Os sacrum*, follow the fourth, and in some the fift.

But here before I intermeddle any further, you shall consider a reasonable cause, why the number of these nerues of *Os sacrum* be not certaine, since as it seemeth eche authour writeth as he founde: which made some describe by others five, others foure &c. the cause I say is to be alledged in this point, like as in sundry other partes, the varietie of nature, and unlike construction of the bodies of creatures. Wherefore *Columbus* willingly declareth *Lib. 8. cap. 8.* that he hath found in diuers bodies *Os sacrum*, to consist of foure, of five, and of vi. bones, albeit neuer of thre (sayth he) as *Galen* falsly affirmeth: howbeit I haue a *sceletō* to testifie the same at this day: so that whatsoeuer was then, it argueth *Columbus* was not of natures counsaile what she would do hereafter.

This note therfore, where *Os sacrum* hath five bones, there are foure holes, and where six, there five betwene bone and bone. Then in these two last holes

Th. iij.

are

Os sacrum consisteth not alway of like number of bones. The autho: hath a *Sceletō* where: in *Os sacrum* both consist onely of these bones.

The ninth Booke of the

are nourished and begon two other payre of sinewes, wantyng in those that lacke the v. and vi. bones. Which after they are egressed or gone forth, beget also, by together knittyng, one notable nerue, which is naturally reflected and distributed amongst the Muscles of the haunches, and their skinne: also inwardly to the partes of Abdomen, as to the Muscles of the straight gutte, and of the bleedar. So in some women to the matrice, and necke of the matrice, with like concourse of other surcles to *Scrotum* and *Perineum*. Likewise from the hinder partes of *Os sacrum*, thzough the same holes are departed other nerues, small, and short, to the Muscles of the backe, haunches, and other posterioir partes of the skinne.

The Names of
the hinder partes
of *Os sacrum*.

Of the Nerus in-
conjugated.

Galene rehearseth besides all these a Nerue inconjugated, or haunyng no fel-
low: but *Vesalius* denyng that, sayth that it may so happen that wherof *Os sacrum* doth consist of fine bones, there the end of the Spinall marey sliding out of the bone may constitute a surcle on eche side. *Collumbus* also not seemyng obsti-
nately resistaunt in this matter, sayth, if any such be, it is to be imagined at the extreme part of the Spinall marey: notwithstanding that in all his tyme, albeit very often, and for that onely purpose he protesteth to haue sought, he neuer found wherfoze to auouche the same. But sayth he, amongst all which hetherto I haue dissected (almost innumerable) I haue sene the extreme part of the Spinal marey in very many surcles, both to the right, and left side, distributed as also further disperfed thzough the fourth Muscle of the thighe, and thzoughout the skinne which is betwene the haunches, and euen downe to the fundament.

So is manifestly argued vnto vs, how deuinely the incomprehensible creator hath made the body of mā, not onely simplie to liue, but aptly to liue, with all requisite partes & parcels thereto. For as no part is destitute of naturall warmthe, tell me what member wateth the vitall and animall spirite: which as the first by the liner and beynes, the secōd by the hart & arteries, so the thyrd by the brayne & sinewes is transposed thzough all the partes. And if nerues be the instruments, of feelyng, & voluntarie mouyng, very iniuriously seemeth *Vesalius* to deny some Muscles to haue them, since they are no Muscles that are without them, as testifieth *Realdus Collumbus* Cap. 8. Lib. 8.

Galen de Neru.
Dissect.
No Muscle is
without one
Nerus or more.

¶ An end of the History of the Animall partes.

¶ Of the History of Man the ix. booke, discoursing
the marey contained in the Bones, Perioftion, and the heares.



Besides that in the History of the nutritiue partes are described the skinned and fatted, and amongst the Cartilages the napples, there remaine yet certaine partes to be spoken of, which, in a solid discourse of the body of mā, may in no wise be omitted, as the marey cōteined within the bones, *Perioftion*, & the heares.

The greatest Bones therfoze haue within them large capacities, whereby, together with their hardnes, they purchase lightenes and agilitie to moue. Notwithstanding such capacite is not in them left empty, but with much marey is stuffed, which, flowyng thether from the cōmon nourishment of the Bones by the small penetratyng beynes, is there made and repofed, and by litle and litle in tract of them receiuyng preparation, both white, & concreafe, till it become a substance fit to the nourishyng of the bones. Of which sort great stoz is found in the bones of the shoulders, armes, thighes, and legges. All other bones, in which are no such large cōcavities, but are either small, or lesse necessary vnto mouyng, do in small celles or pozie places conclude

a hu

Fernel. Lib. 1. cap. 15
Of the marey in
bones.

How marey is
engendred.

Where is the
chief stoz of ma-
rey.

What marey
smaller bones
containe & how.

a humoꝝ moꝛe liquid the marey, and moꝛe thinne oꝛ melted, but which notwithstanding standyng aunſwereth thereto in a certaine proportion. The brayne and Spinall marcy haue an other maner of ſubſtance, as befoꝛe in the deſcriptiõ of the Spinall marcy is declared. And thus much of marey the proper nourishment of bones, is ſufficient.

Perioſtion is a ſinewy Membran, & thinne, which clotheth and enwꝛappeth the Bones, & is endewd with much ſenſe: wherfoꝛe many are deceived, thꝛough the ignoꝛaunce of this Membran, ſuppoſing the bones to ſeale: foꝛ this Membran in the inſide of the Scull do not ſeake. Foꝛ there is no ſuch thyng, although vnder

Pericranium it may be found: neither are the teeth inueſted with *Perioſtium*. Foꝛ what ſtode the teeth in neede of it? Neither is it layd in the Articulation of bones: foꝛ ſo if it ſhould be, it would excite meruailous paynes in the mouyng of the, as ſomewhat alſo we haue touched befoꝛe in the beginnyng of the Diſcoꝛy of bones.

The heares although they ſeeme ſuperfluous partes I know not how, yet becauſe they are as a certaine covering of our body, of them alſo a deſcription is neceſſarily required. Foꝛ beſides that they couer the body, as we haue ſayd, they ſerue alſo in the ſteede of a propugnacle. Some do adde a thꝛd vſe of the heares, that is, that thoſe fuliginous vapours which are eleuated in the thꝛd concoctiõ of nourishment, whileſt it paſſeth into the ſubſtance of the mebers, ſhould be conſumed into the nourishment of heares: which ſentence *Collubus* neither prayſeth nor diſprayſeth. But heares are made alſo (ſayth he) foꝛ decencie of ſourme. They ſpring forth of the ſkinne in perfoꝛatyng the ſame. The rootes of the heares are thicker then the other partes of them, and are faſtened to the fat, which betwene the ſkinne and fleſhy Membran is ſited, the purſe of the Teſticles excepted.

Wherfoꝛe the heares take their nourishment from the fat and theſe foꝛe encrease. They grow almoſt in all places, but chiefly where the ſkinne is hoate and drye: foꝛ the cold & moyſt is vnapt to the bringyng forth & containyng of heare. **W**here the ſkinne is hard and drye, as in the head and chinne, there is brought forth the lōger & ſtiffer heare. The rootes of the nayles and heares are tender and ſoft: but that which is extant without the ſkinne, is ſtrong and very hard.

In man the heares are begotten partly together, partly afterwarde. In the head they are naturally engendꝛed, but properly in the evelyddes and browes, which nature frõ their firſt growth euer keepeth in alike greatnes, hauyng ſtred them leaſt they ſhould encrease, into a moſt hard ſkinne like to a Cartilage: theſe are ſtretched and ſtable, not onely foꝛ comlynes, but alſo to defend the eyes from moles, heares, and ſuch outward accidentall annoyances. The heares which are after begotten firſt bzꝛſt forth about *Oꝛ pubis*, & the fundament, next in the arme, pitted, and in men laſt of all in the chinne. In the ſole of the foote and ball of the hand grow no heares, and that (ſay ſome) becauſe of the broad Tendon: whiche, the ſote of the Hare hauing the ſame, and yet filled with heare, conſuteth. But in ſoꝛe thoſe partes in man to be without heare, both vſe and mouyng required: foꝛ in the Hare ſuch hearynes furthereth her ſwiftnes.

Now here I will make an end, ſince all thynges ſeeme ſufficient playnly expounded, whereby the meruailous woꝛkemaſhꝛy, and ſubtil contexture of the members may be reucaled.

The brayne and Spinall marcy is of contrary ſubſtance to this.

Col. Lib. 13. cap. 3. How it happeneth that ſome ſuppoſe the Bones do ſeale.

Perioſtium is not on the inſide of the Scull. The teeth are voyde of Perioſtium.

Why Perioſtium may not be in the ioyntes.

Col. Lib. 13. cap. 2. The vſe of the heares.

The procreation of heares.

Whence the heares do ſpring.

Whence heares are nourished.

Fernel. Lib. 1. hu. corp. cap. 15. In what places heares growe moſt.

The heares grow not all at one time oꝛ from one beginnyng.

The vſe of the heares of the evelyddes.

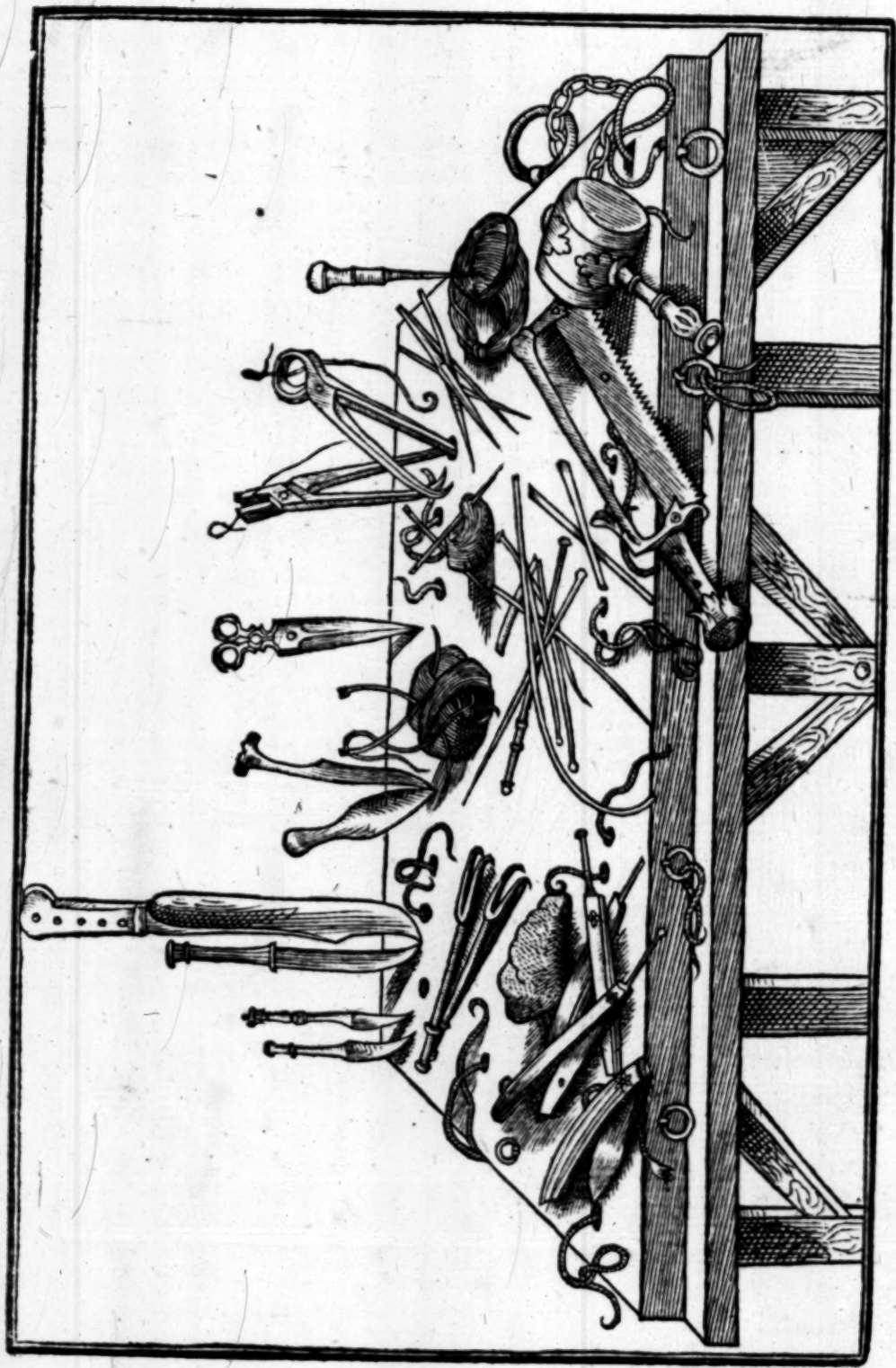
The opinion of ſome reproued in yeſdyng a reaſon of the not hauyng heare in the ball of the hand and ſole of the foote.

Col. loc. cit.

An end of the ix. and laſt Booke
of the History of Man.

Ph. iiii.

✶ A Table of the Instrumentes ſeruyng to
Anathomycall diſſection.



A Table wherein is quoted the place of euery Principall matter contained in this History, to be sought vnder the Letter Alphabetically, and to be founde by the direction of the Figure.

Wherein the Reader is to be forewarned, that euery Prædicare is to be sought vnder his subiect, not els to be found in this Table: as to seeke the Appendances, Veynes, Nerues of the Teeth, he must looke vnder the name of Teeth, not of Veynes, Nerues or Appendances: and this order is obserued in all the other.

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